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FORTUNES

MADE IN BUSINESS

A

SERIES OF ORIGINAL SKETCHES

Biographical and Anecdotic

FROM THE

RECENT HISTORY OF INDUSTRY AND COMMERCE

By VARIOUS WRITERS

VOLUME III.

LONDON:
SAMPSON LOW, MARSTON, SEARLE & RIVINGTON
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1887.

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PREFACE.

In issuing a Third Volume of this Work, the Editor cannot do less than offer his grateful acknowledgments for the generous reception accorded by the Press and the public to the previous Two Volumes—a reception which has led not only to the simultaneous publication with this of a Second Edition of those Volumes, but has been the main factor of encouragement in the extension of the undertaking.

The aim has been to make the work as representative as possible of some of the best and most enduring features of the business history of the time, not merely to tender homage to success and wealth. Every story here recorded carries with it the lessons of small beginnings and noble aspirations—of resolute perseverance and commanding integrity—and reveals achievements of far greater importance than the acquisition of individual riches. Fortunes have been made, and fortunes have been dispensed, for no great industrial concern can be built up without its benefits extending to the community as well as to its founders and heads. England would have been all the poorer materially if these fortunes had not been won within its boundaries; its workshops would have been less active, its position in the world of invention less illustrious.

The ground covered by this volume is wide; it has for its landmarks some of the leading incidents of the commercial progress of the century, and presents many valuable points for study and reflection.

In the history of the firm of Horrockses, Miller and Co., for instance, we have brought into prominence most of the links of that wonderful chain of mechanical development which has made and held together the cotton trade from the time of Arkwright downwards; in the record of the operations of the Mintons we are in touch with the different stages of the growth of art pottery in this country; and in the chapter on the famous firm at Elswick, we find not only the story of the guns, so far as England is able to tell it, but have set forth the perhaps more interesting story of the invention and introduction of some of the principal examples of hydraulic machinery. The history of the Henrys of Manchester informs us of the lives of the pioneers of the great American trade with England, and forms a chapter of modern merchant romance that can hardly fail to prove of value; in the history of the Crossleys we have a narrative of striking tenacity of purpose and industrial conquest in the carpet trade; in that of the Kitsons of Leeds, our locomotive system is traced through its many ramifications; in that of the Richardsons of Bessbrook, the rise and growth of the Ulster linen trade receives illustration ; in that of the Platts of Oldham we note the establishment and gradual extension of machine works which have become the largest in the world; and in that of Sir Donald Currie are able to mark the advantage of bringing to bear a quick intelligence and large experience in the opening up of a new line of ocean steam service, that has greatly benefited both England and South Africa.

The endeavour has been to give the personal features of these various histories in as clear a light as might be, yet not to let the portraits appear without the touch of humanity, as well as of business. At the same time, it has been sought in all cases to give some adequate picture of the various phases of industrial life with which the fortune makers have been or are identified. The task has not been of the easiest, perhaps, but it has at least been one that in the writing has called forth a sympathy and an appreciation which, it is to be hoped, will extend in some measure to the reader.

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HORROCKSES, MILLER & CO.

HORROCKSES, MILLER & CO.

IN the year 1768, a wandering wig-maker, named Richard Arkwright, returned to his native town of Preston, after many months of weary searching for employment in other parts of Lancashire, and obtained temporary lodging in the house of his friend, Mr. Ellis Henry, the head master of Preston Grammar School, at the bottom of Stoneygate, a house which, in these days, does duty as an inn, but of which the sign, "The Arkwright Arms," still commemorates the brief residence there of the ingenious manipulator of hair. It was known that, besides his wig-making, the mechanical arts engaged a good deal of Arkwright's attention; indeed, he thought so much of the latter, that he was far from being successful in the calling he ostensibly pursued. The one great idea that in its fruition was destined to bring him fame and fortune, had already taken possession of him, and kept him in poverty. So poor was he, that when he wanted to go to the polling-booth at the great election of 1768, his friends had to subscribe together to raise sufficient funds to buy him a suit of clothes, the only garments he owned not being good enough to enable him to present a respectable appearance. There were those who believed in him, however, and had faith in his ambitious projects, and, although it was not in Preston that he ultimately brought his invention to the point of success, his memory always remained an active influence in the town of his birth, and paved the way for the establishment there of that factory system which has since done so much to make Preston one of the most prosperous industrial centres in the North of England.

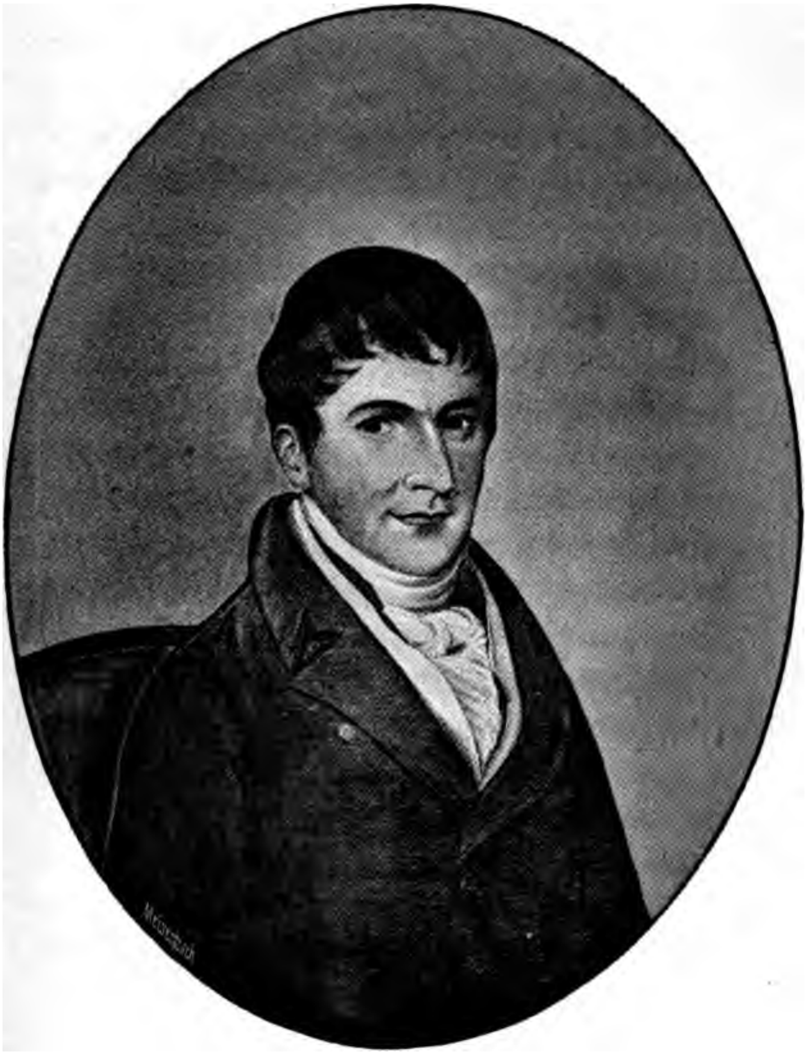
In the same year that Richard Arkwright went in his new suit to vote for the Corporation candidates, Sir F. Standish and Sir P. Leycester, and had his vote refused on the ground of non-residence, there was born into the family of a small quarry-owner, named Horrocks, at Edgeworth, near Bolton, a son, who was afterwards to make his mark upon the town of Preston as one of the pioneers of the cotton trade. This son was christened John, after his father. He was the younger of two surviving sons of a family of eighteen children, and as he grew up to manhood, he and his brother Samuel helped their father in the business of making and selling millstones. But young John Horrocks was not content to devote his life and energy to the chipping of stones. He saw growing up round him a gigantic trade, to which the inventions of Watt, Kay, Crompton, and Arkwright had given marvellous impetus, and he longed to participate in the progress and development of the new era of manufactures. It was not long, therefore, before John Horrocks came to the determination to try his fortune in cotton spinning, and, with him, to resolve was to do, so, bold yet cautious, he contrived to get a few spinning frames, and had them erected in a corner of his father's offices. Although he did not altogether relinquish his original work of dressing and polishing millstones, he gave himself to his new occupation with so much ardour and industry, that even his father was compelled in time to acknowledge that the prospects of the cotton yarn trade were much more encouraging than those of millstone quarrying.

John Horrocks laboured early and late at his new business. He worked his spinning-frames with his own hands, and was so painstaking and thorough in every detail, that the yarn he turned out acquired a high reputation for its excellent quality. The principle that he laid down for himself at the commencement of his career, and to which he rigidly adhered through life, was that the work that his machines accomplished should be the best of its kind. This principle was the foundation of his fame and prosperity, and, as followed out by his successors from that time to this, has been the grand sustaining power in upholding the pre-eminence of the business which he originated. From time to time Mr. Horrocks went out with his yarn into the manufacturing districts of Lancashire to sell it, and found in Mr. John Watson, of Preston, one of his best customers. Mr. Watson was at that day the owner of the only mill in Preston. It was situated in Moor Lane, and had been built by himself and a former partner, Mr. Collinson, in 1777. Mr. Watson had also a factory in the adjoining township of Penwortham, and may be regarded as the leading spirit of his day, in the founding of the cotton industry of that great trade centre of North Lancashire.

Mr. Horrocks brought his yarns to Mr. Watson's warehouse at Preston all the way from Edgeworth on horseback. Mr. Watson was a keen business man, and always bought at the lowest possible price. On one occasion he and young Horrocks had a disagreement as to the sum to be paid for certain yarns, and the latter was so much annoyed that he declared he would not let Mr. Watson have any more of his yarns at any price, but that he would come to Preston and begin business there for himself. "You will then find me a thorn in your side, Mr. Watson," he said, and he turned upon his heels, and between him and the man who, up to that time, had been his best customer, there were no further dealings on the old lines. Success had given Mr. Horrocks confidence and independence. He had relinquished the millstone business altogether now, had increased his number of spinning-frames, and had employed a few "hands" to assist bim in his operations. In place of the "ambling nag," with which he used to make his rounds with his yarns, he now indulged in the luxury of a gig, and began to be looked upon in the quiet neighbourhood of Edgeworth, as a man of some little consequence.

After the dispute with Mr. Watson, and his threat to establish himself at Preston, Mr. Horrocks lost no time in carrying out the new ideas which had been set in motion in his busy brain. So, in January, 1791, he removed from Edgeworth to Preston, and, in a small building at the bottom of Turk's Head Court, began operations, there realizing, for the first time, the additional advantage of working up his own produce, and becoming a manufacturer as well as a spinner. He erected two carding engines on his new premises, and had his spinning done for him for a time in private houses. He produced a good quality of yarn, and his business connection rapidly extended. The yarn was given out to hand-loom weavers in the neighbourhood, who flocked to him for work in large numbers as the fame of his enterprise gradually increased. Whether he was a thorn in Mr. Watson's side or not, he was not long in proving himself a formidable rival to that gentleman in the manufacture of cotton fabrics.

The time and place were peculiarly favourable



THE "ORIGINAL HORROCKS."

[*From a Painting in the Possession of the Firm.*]

to the establishment of a business such as that upon which John Horrocks had embarked. The time was the infancy of the cotton manufacture and the factory system—the time of the first development of those wonderful inventions by which the power of production was multiplied a thousand-fold, and the quality of the products improved in almost a corresponding degree. It was a time when fresh markets for cotton were being opened up in all parts of the world; when between the cotton fields of America and the looms of Lancashire a connection had been established which was to yield golden results both to the New World and the Old. It was a time of "pith and moment" which presented unparalleled opportunities to men of foresight, energy, skill and enterprise, such as John Horrocks. Up to 1760 the cotton machinery of England was almost as simple in its character as that of the East. All the processes were performed by hand. But by the time that Mr. Horrocks started his little manufacturing concern in Turk's Head Court, in 1791, some of the most noticeable of the inventions of the men who made the latter half of the eighteenth century memorable for all time in the history of industrial progress, had been brought into operation. Kay had invented the fly-shuttle, by which a weaver's power of production had been doubled. Arkwright's "water-frame" had been patented in 1769, the year following that time of his poverty in Preston of which we have previously spoken; in 1767, Hargreaves introduced the "spinning-jenny" to the world; and a few years later the principles of Arkwright's and Hargreaves's respective inventions were united by Samuel Crompton in the mule-spinning frame. By these inventions the whole course of the textile industries of the world was changed, and England assumed a leadership as a manufacturing nation which, despite the later, and exceedingly vigorous, efforts of other countries, she has never had to relinquish. James Watt was just beginning to apply his steam-engine successfully to the cotton manufacture when John Horrocks was making his first pieces. The time, then, was the very best time that could have been chosen by a man of determination and ability to make his mark in the manufacturing world.

As to the place, the conditions were also favourable, though perhaps not more so than in some other towns. In one sense they might be regarded as the reverse of favourable, for Preston had borne through many centuries the reputation of being "proud," and pride and trade were in those days somewhat conflicting terms. There were, it is true, many things of which Preston might justly be proud. She might be proud of her beautiful river, the Ribble, which descends upon it from the mountains of Yorkshire; she might be proud of her long and distinguished municipal history; she might be proud of the many rights and privileges which the various monarchs of England had conferred upon her; she might be proud of her ancient guild, dating back to the fourteenth century; and she might be proud of the many famous citizens she had produced; but, as for being proud of her cotton trade, that was another matter altogether. The pride which clung to Preston in the latter days of the eighteenth century, and which had gained it its name of "proud Peston," was a pride of another sort. She was proud of her connection with the Derby family, who had a residence there, "Patten House," where the earls of the period used occasionally to sojourn, keeping open-house there during the week of the annual races; she was proud of the supposed superiority of culture, speech, and demeanour of her sons and daughters; and she was proud of being able to look down with contempt upon people engaged in trade. To some little extent this kind of pride still lingers amongst the people of Preston, but the influences which John Horrocks brought to bear upon the aristocratic affectations of the community, and the imitation his powerful example brought forth, have told their tale, and at the present day Preston is as proud of its cotton trade as of the more ancient contributions to its fame as a town. Even so recently as half-a-century ago a local historian wrote:—"The inhabitants (of Preston) are proud and ostentatious; a regular distance is always kept alive between the various ranks of society: inferiority (in social position) is often met in the public walks with repulsive countenance and half-averted eyes." It must be admitted that the reasons for the term "proud Preston" were not far to seek in the early days of the cotton manufacture.

Until John Horrocks awakened the town into new life, it had for centuries enjoyed a sort of refined stagnation. The population had not been more than about 6,000 for many generations, and without the introduction of new blood, would probably have continued stationary for generations more.

Few men have so exactly fitted in with an opportunity as John Horrocks did. Before the expiration of his first year at Preston, the building in Turk's Head Court was altogether too small for the extent of his business. The excellence of his cloth had made its impression upon the trade and was in ever-increasing demand; he therefore sought a wider sphere, and having saved some money, looked round him for a site whereon to build a new factory. His capital being hardly sufficient for this, he sought a partner, and found one in Mr. George Bolton, of the firm of Shuttleworth, Bolton, Claytons & Moore, bankers, Preston. The new factory was proceeded with on a site in Dale Street, near his original works, and was completed without delay, although not without an interruption in the recently-formed partnership. Mr. Bolton took a walk down to see the progress of the works one day, and found the building far advanced towards completion. The size of the structure, however, surprised him; it was far beyond his notions of what was intended, and he became alarmed. He went to his partner and remonstrated with him upon the folly of erecting a building of such magnitude; but Mr. Horrocks was not a man to be diverted from his original purpose by unnecessary fears, so he simply took steps to procure a dissolution of the partnership, and Mr. Bolton disappeared from the connection. Mr. Horrocks was not long in obtaining a more suitable companion for his venture. In Mr. Richard Newsham, of Preston, afterwards one of the partners in the Old Preston Bank, Mr. Horrocks found a congenial spirit. From this Mr. Newsham descended one of the most philanthropic and estimable of Lancashire gentlemen, the late Mr. Richard Newsham, of Preston, who recently died, and bequeathed a splendid gallery of paintings to his native town. This first mill, built by Mr. Horrocks, is of very small dimensions as compared with the factories of more recent times; but it served its purpose well, as far as its capacity went, and still stands, with white-washed front, a time-honoured, much-venerated memorial of an important past. On its front it bears the date of its erection, 1791; and although it is completely dwarfed by the clusters of immense mills by which it is now surrounded, it has by no means fallen into decay. Until very recently it was used for the purpose for which it was originally designed, but has latterly been "pensioned off," as it were, and is now permitted in its old age to enjoy the comparative repose of a place of storage.

Scarcely had John Horrocks got his new factory into full working than its rapid money-making power put him in a position to enter upon a further extension of his business. The name of Horrocks became, as it has remained ever since, a household word wherever good cotton fabrics were used. Horrocks' long-cloths secured a reputation that ultimately extended to every part of the habitable globe. All this was done within a year from the time John Horrocks started business in Preston. This mill, still well known as the Yellow Factory, was the nucleus of the present Yard Works, a series of magnificent blocks of mill premises from which more cotton has been sent out than from any other factory buildings in the neighbourhood, the producing power of these works at the present time being greater than was that of all Lancashire in 1791.

The motive power at the Yellow Factory was a horse, Watt's invention not having yet been brought within the reach of the ordinary cotton manufacturer. The horse was located in the cellar, and there performed its dull round from day to day, turning the carding engines in the room above, the spinning being, of course, done by hand. The demand for cotton goods was almost insatiable, and, for the cloths made by Horrocks, quite in excess of the power of supply. Extension after extension was made, and still the builders could not keep pace with the requirements of Mr. Horrocks. Fortunately, the profits were large, and placed the firm in the position of being able to increase their premises without having recourse to outside monetary help. Within the period of ten years from the time of his first setting up business in Preston, Mr. Horrocks was the proprietor of no fewer than seven extensive cotton-spinning factories; and even the old building on the edge of the family stone quarry at Edgeworth was utilized as a cotton mill.

By this time the people of Preston—"proud Preston"—had begun to look with some degree of favour upon this "new man" of trade. He was a success, and even social pride can afford to associate itself with success. But John Horrocks displayed a great amount of tact in bringing the Prestonians over to his side. The factory system was little liked at the beginning, for weavers and spinners had been accustomed to do their work at their own homes, at their own time, without control or supervision. It seemed absolute cruelty to them to be asked to work from a certain time in the morning to a certain time at night, with stated periods (not too long) for meals; and in some cases there is no doubt the change amounted to a real hardship. Many were, by the adoption of the factory system, shut out from the processes of the cotton manufacture altogether. At the same time it must be allowed that the alteration in the mode of working admitted of the realization of greater results for the employed as well as for the employer, an improvement in wages generally accompanying the introduction of factory labour. The system was greatly abused as time went on, it is true, but successive legislative enactments have toned down these things to their proper level, and we have now a factory system from which all the elements of slavery and cruelty have been eliminated, and which affords a protective condition of labour, compared with which the labour of the field and the occupations of ordinary handicrafts are severely irksome toil. John Horrocks did not shut his eyes to the opposition with which his enterprise was regarded in certain quarters, but as far as the super-refined were concerned, he did not trouble himself to conciliate them ; he had his work to do, and would do it. With the operative classes it was different. Their friendly co-operation was a necessary element in his scheme of fortune-making, and from the first he strove to be on good terms with them. The population was sparse and scattered ; and those who had been accustomed to do their work at their own homes, naturally objected to the inconvenience of walking long distances to their daily toil. With the view of lessening this difficulty, Mr. Horrocks erected five of his factories in different parts of the town, considerably apart from each other—a stroke of policy which helped him greatly in overcoming the objections to the new mode of working.

The Yard Factory was built in 1792, and being burned down in 1796, was re-erected the same year. The Frenchwood Factory and the Old Moss

Factory were also built in 1796; another factory at the Moss was put up in 1797; the Canal Factory in 1799; and the "Top-o'-th'-Yard" Factory in 1802. These were all erected under the personal direction of John Horrocks.

John Horrocks was a born business man, and possessed the power of organization in a very remarkable degree. He was a plain, blunt man, given to express his thoughts without polish or circumlocution; but he was straight and thorough, and as free from artifice as it was possible to be. In his intercourse with his workpeople, he was always kindly where kindness would avail, but when it was necessary for him to assert his position and make manifest his authority, he was equal to the occasion. Gentle as a lamb in his ordinary demeanour, his quarry experience had taught him that it would be folly to hew millstones with a feather, so that when obstinacy or insubordination required to be dealt with, he could be as fierce as a lion. Of educational knowledge he had very little, but Nature had done more for him than could be done by all the arts, so, strong in his own natural power and individuality, he entered the world of trade with a brave heart, and achieved reputation and fortune with a rapidity that was marvellous in those days.

Anxious that his relatives should partake of his prosperity, he invited his elder brother, Samuel, over from Edgeworth, and, after employing him in a position of management for a time, offered him a partnership, which was readily accepted. Other relatives, Isaac and George Horrocks, were also imported into the concern, the former ultimately having the premises in Turk's Head Court given up to him, continuing in partnership there with Mr. Newsham afterwards for many years. Some time subsequently Mr. Newsham retired from the firm, and Mr. George Horrocks succeeded to his place. In July, 1801, Mr. John Whitehead and Mr. Thomas Miller, sen., were admitted into the partnership, and the firm became known as Horrockses, Miller and Co.

The various works planned and carried on by the energy of John Horrocks, gave an immense impulse to the trade of the town. Shops, houses, and places of business were erected on all sides, and other mills rose in different quarters, and the population, which had stood so long at about 6,000, increased with startling rapidity, and the aristocratic, historical old borough cast off its old-time aspect, and awoke in full activity, with its tall mill chimneys stretching skyward, and its many-storied factories, altering the whole character of the landscape, while the busy hum of machinery served to stir the town into such life and motion as it had never before dreamt of.

So powerful an impression had been made by John Horrocks, the young quarryman, upon the people of Preston, that, after a while, they began to adopt him as part and parcel of their native pride. They acknowledged to themselves the good he had done to the town, and were proud of his commercial achievements. Thus it came about, that before he was twenty-eight years of age, John Horrocks was fixed upon as a fit and proper person to enter the lists against the powerful Stanley family, and contest the borough in opposition to their nominee. This was in 1796. The entire weight of the old aristocratic influence was exerted against him, and he was unsuccessful, but the strength of his popularity was such, that he only lost the election by fourteen votes. Lord Derby had now to admit that the control of the representation of Preston was being wrested from him. And so it proved six years afterwards, when Mr. Horrocks was again brought forward. During the ten years that he had been settled in the town the population had almost doubled itself, and in the six years that had elapsed since the previous contest, Mr. Horrocks had so increased his influence, that the former opposition came to terms with him, and he had the honour of being returned to Parliament unopposed.

At first, he had been reluctant to set himself in antagonism to the great influence of the Derby family, but the newer generation, now grown so numerous and so powerful, were so earnest and active in their support, that it was thought his chances were exceedingly good. The candidates in the Derby interest were Stanley and Hoghton, the latter being the representative of the ancient family of the Hoghtons, of Hoghton Tower, one of the most prominent objects in the valley of the Ribble, and the place where, according to tradition, James I. knighted the loin of beef. It was another instance of "new men" against "old acres." Mr. Horrocks had the support of the Corporation, of which body he had been elected a member, and he had also the help and influence of the Manchester Church and King Club, which exercised a very potent power in the politics of the County Palatine in those days. The poll was open for eleven days, and on the morning of the last day the returns stood thus: Stanley, 772; Hoghton, 756; Horrocks, 742. At this point Mr. Horrocks retired from the contest.

After this, the young manufacturer threw his whole soul into his business, and before the next election came round had secured so strong a footing in the borough that it was felt he could not be opposed again with success whenever he should decide to seek Parliamentary honours. Accordingly, before the election of 1802, a compromise was effected. It was arranged that the Derby family should nominate one candidate, and the Corporation the other; and to carry this into effect, Lord Stanley, as the Whig representative, and John Horrocks, in the interest of the Tories, were allowed to be returned unopposed.

While in Parliament, Mr. Horrocks attracted a good deal of attention, for the fame of his industries had gone before him. He may be regarded, indeed, as the pioneer of the long list of "cotton lords" which came after him. Pitt held him in great regard, and acknowledged his power. Visiting Woolwich one day, Mr. Horrocks saw cannon being bored by hand. "What!" he exclaimed, "boring cannon by hand! Why, that ought to be done by machinery. I must see Pitt about this." He did, and boring machines were soon afterwards introduced.

It was not given to him to enjoy his new honours long. Offices had been opened by the firm in London, and while Parliament was sitting he divided his time pretty evenly between his desk in the City and his seat in the House of Commons. It was while in town that he was seized with illness and died at the early age of thirty-six. His brusque manner, Northern accent, and vigorous bearing were often the source of amusement to his colleagues in Parliament, but, above and beyond these qualities, he was so full of heart and manliness that he was much respected and esteemed, and when his death occurred the event was deeply and sincerely regretted. Thirteen years before, he had entered Preston a poor man; on his death he bequeathed to his two sons a fortune of £150,000. He was buried in a corner of the picturesque churchyard of Penwortham. His parents lived to see him at the height of his career. One Sunday his mother was in Preston Parish Church, and as she saw one son walk down the aisle of the sacred edifice as the member for the borough and the other as the mayor, at the head of the municipal body, tears of joy and pride rose to the old woman's eyes, and for the time all power of speech went from her.

John Horrocks was a man of remarkable promptitude; he arrived at a decision quickly, and once having resolved on a course that he thought right he pursued it to the end irrespective of what anybody might do or say. When he started business his first bill was taken to Mr. Crane, of Preston, to be discounted. Mr. Crane did what was required, but subsequent transactions causing him to be a little uneasy, he thought he would step down to the works in Turk's Head Yard, and have a look round by way of reassuring himself before letting any more of his money go to the young manufacturer. When he reached the place he peeped in at the door, and saw Horrocks hard at work on the floor. He needed no further confirmation of the good qualities of his client, but readily gave the assistance asked for, and was always open to do business with him afterwards in any way that was desired.

A remarkable characteristic of John Horrocks was his punctuality. On one occasion, Mr. Palmer, Town Clerk of Preston and County Coroner, summoned a meeting of the Commissioners of Penwortham Bridge for ten o'clock in the morning. It was half-past ten before Mr. Palmer turned up, and as soon as he appeared Mr. Horrocks astonished him with the query, "Palmer, have you a watch?" "Yes," was the reply, "and a very good one too. I'll show it to you." "Well," said Horrocks, "and what time is it?" "Half-past ten," answered the Town Clerk. "Just so," said Horrocks, "but this meeting was called for ten o'clock, and you are not here until half-past. Remember that servants should be punctual whether their masters are or not." After the meeting Horrocks took young Palmer by the hand and earnestly but kindly told him that he might miss his meal, his rest, or his pleasures, but never ought to miss an engagement. This so affected Mr. Palmer that he never again was known to fail to keep an appointment, and came to be looked upon as one of the most regular and methodical men in the town.

John Horrocks was succeeded as chief partner by his brother Samuel, who was also returned to Parliament. He differed much from John, and was known as "the silent member for Preston." Once he was heard to ejaculate in the House of Commons a feeble "Oh!" and this gave rise to his often being twitted in his subsequent election campaigns on his "eloquence." He lived until March, 1842, during which year his son Samuel was serving the office of guild mayor. Samuel Horrocks, sen., was a man of enterprise and ability, but was by no means so gifted with these qualities as his more distinguished brother had been. He, however, had the good sense to work out the ideas which the master-mind, the founder of the business, had conceived, and on those lines he and his partners continued to conduct the business of the firm with very great success.

It has already been mentioned that amongst the partners admitted into the firm at a somewhat early period—in 1801, in fact—was Mr. Thomas Miller the elder, who had been connected with farming in a small way at Bolton. When John Horrocks, the originator of the business, died in the following year, he left his share in the concern to his trustees—Samuel Horrocks, Richard Ainsworth, and Nicholas Grimshaw, in trust for his son John, to carry on the business until the latter attained his majority, in 1815. Mr. J. Whitehead, a before-mentioned partner, died in 1810; and on the 1st of July, 1811, when a fresh deed of partnership was signed, the members of the firm consisted of John Horrocks's trustees, Samuel Horrocks the elder, Thomas Miller, Samuel Horrocks, and John Bairstow. When John Horrocks the younger came of age in 1815, he sold his share in the business to his uncle, Samuel Horrocks, Thomas Miller, and Samuel Horrocks, and on the following day, the 17th of February 1815 a new partnership was constituted, consisting of the following members: Samuel Horrocks, sen., Thomas Miller, sen., Samuel Horrocks, John Bairstow, and Peter Horrocks, under the style of John Horrocks & Co. in London, and Horrockses, Miller & Co. in Preston. Other changes in the partnership took place from time to time, by death or otherwise; and after the decease of Samuel Horrocks the younger in 1846, Mr.

Thomas Miller, jun., became the principal partner, the shares of Samuel Horrocks "surviving" to Mr. Thomas Miller, jun., and his brother, Mr. Henry Miller. In 1860, Mr. Thomas Miller, who was an alderman of the Borough, became, on the retirement of the late Mr. William Bowman, the sole proprietor of the gigantic business carried on under the title of Horrockses, Miller & Co., but from the 1st of January of the following year, Mr. Edward Hermon, who had charge of the London office of the firm, was admitted a partner. Alderman Miller died in 1865, leaving a fortune of close upon half-a-million.

Edward Hermon was the son of a south-country gentleman of modest rank, and entered the London office of Horrockses, Miller & Co. as principal clerk, at the age of twenty-four, holding that position up to the time of his becoming a partner in January, 1861. When Mr. Hermon took the reins of management, he brought to bear upon the practical part of the business a capacity which could hardly have been expected in one who had not had a training in the factory, but by his energy and ability soon mastered all the details of the working of the concern, and speedily made himself a name in the town of his adoption. When Mr. Thomas Miller died, in 1865, Mr. Hermon became the sole proprietor of the undertaking. He admitted Mr. F. Styles, who had succeeded him in the direction of the London office, as a partner on the 1st of January, 1866. Mr. Hermon accumulated considerable wealth, and manifested great interest in public affairs. In the year 1868 he was invited to become the Conservative candidate for Preston. He consented, and was successful, winning a gallant and splendid fight. He was exceedingly popular, and remained member for Preston until the time of his death on the 6th of May, 1881, when he was seized with illness in the House of Commons, and died at his town residence, Berkeley Square, a few hours afterwards. He was buried in the churchyard of Peppard, in Oxfordshire, within two miles of the mansion of Wyfold Court, which he had erected.

In 1870, Mr. W. Pollard, who had up to that time been in the service of the firm as manager, was made a member of the partnership, and continued in that capacity until 1878, when he retired. In 1873, Mr. Edward Hermon's two nephews, Mr. S. O. Hermon and Mr. S. A. Hermon, joined the firm ; and in 1880, the year before his death, Mr. Hermon, M.P., withdrew from the concern, leaving Mr. Styles the senior partner, as he still remains.

In March, 1885, however, an arrangement was come to between the firm of Horrockses, Miller & Co. and that of Messrs. Hollins Bros., the proprietors of a block of mills immediately adjoining the Yard Works of the older firm, by which an amalgamation of interests was effected, the two firms becoming consolidated in one immense enterprise. As thus re-organised and augmented, the concern of Horrockses, Miller & Co. is made of still greater magnitude, and constitutes one of the largest and most important business undertakings in the kingdom. The firm of Hollins Brothers commenced operations in the Sovereign Mills, Preston, in 1871, where they have since successfully carried on the manufacture of calicoes, long cloths, and sheetings, the demand for their productions being so large that after a few years they purchased the neighbouring Stanley Street mill for the extension of their business. The two active partners, Mr. Frank

Hollins and Mr. W. W. Galloway, have gone over with the Hollins Brothers' interest, and now, along with Mr. Styles, Mr. S. O. Hermon, Mr. S. A. Hermon, and Mr. W. B. Secretan, form prominent members of the great partnership concern which by the new arrangement receives such satisfactory economical consolidation.

John Horrocks, the founder of the firm, aimed at securing a large home trade, and always took care to send to the market what he knew to be a good sound cloth. No piece of inferior quality was allowed to be made at the Yard Works. Thus the name of Horrocks came to carry with it the stamp of quality wherever it went, and to have Horrockses' cloth was to possess the best that was made. So successful was the firm with the products of their looms that it is said the after-time demand in London alone was almost enough to keep the works going. Their shirtings and long cloths were specialties in the great drapery establishments, and always commanded special prices. Though the competition has vastly increased in these later times, and though the "ready-made" trade has affected many firms, Horrockses, Miller & Co. have successfully maintained their ancient prestige. The firm have special quotations in the market lists, and not only do their goods rank as among the best in the home trade, but their cloth has a special market in India. It is well known that when the perambulating village cloth retailers of Hindostan go out to sell their cloths, made attractive to the eye with headings of brilliant colours, they seldom fail to secure a purchaser when they offer for sale a length of "Horrockses." The best raw material has always been used by the firm, and as machinery was introduced and fresh inventions were brought forward, they were ever amongst the first to avail themselves of the improved means of production. The power-loom, which was not adopted in the cotton trade until long after the death of the founder of the firm, gave Horrockses an immense advantage, enabling them to cope to a much greater extent than formerly with the constantly increasing demands for their cloth. John Horrocks was not unmindful of what had been done in his time in the direction of perfecting the power-loom which Dr. Cartwright—poet, parson, and inventor—had patented towards the close of the last century, but the invention was, in Mr. Horrocks's lifetime, totally inadequate to the weaving of anything but the coarsest kinds of cloth, and could not have been utilized at all in the manufacture of the finer fabrics for which the eminent Preston firm had gained so great a reputation. In 1790, the year before Mr. Horrocks settled in Preston, Messrs. Grimshaw, of Gorton, under a license from Dr. Cartwright, had erected a weaving factory at Knott Mills, with the view of attempting to improve the power-loom, but after a great expenditure of money in fruitless experiments they abandoned the undertaking, the burning down of their factory affording them a good excuse for leaving the power-loom to the enterprise and skill of others. The course of invention was keenly watched by the Horrockses, and when, in course of time, the power-loom was improved so as to be acceptable to them, they immediately introduced it into their works. In the memorial sent from Manchester to the Government, in August, 1807, calling attention to the great advantage which had accrued to the commerce of the country through the inventions of Dr. Cartwright, in the bringing to perfection of which, it was urged, he had expended a large private fortune; a memorial which expressed the hope that the Government would be pleased to reward the inventor's important services with "some substantial mark of their favour and the gratitude of the country"; there occurred the signature of "Horrocks & Co., Preston." The memorial was also signed by the firm of "J. Watson & Sons," John Horrocks's old friends, and by three other Preston firms which had been brought into existence in the town by the example afforded them by John Horrocks. These firms were—Paul Cotterall & Co., Sidegreaves, Leighton & Co., and Riley, Paley & Co. In connection with the power-loom, that was afterwards to effect such a revolution in the textile industries of this country, it may be mentioned that Mr. Andrew Kinlock, who introduced such improvements in the machine as rendered it available for all the requirements of the cotton trade, lived many years in Preston, and died there in 1849, at the ripe age of eighty-eight, being buried in the graveyard of St. Peter's Church.

An extensive series of loom-sheds were erected by John Horrocks in the hand-loom days in a suburb of the town which subsequently came to be known as New Preston. These sheds were flanked on each side by long streets of neat and commodious cottages for the weavers and their families, and paved the way effectively for the subsequent introduction of the loom that was to be worked by steam-power. The great change that was accomplished by the bringing into use of the splendid succession of inventions which followed upon the heels of Arkwright's famous spinning-frame can scarcely be realized in these days. It is stated that a thousand operatives employed at the present time in a cotton factory, with all the appliances at hand which the mechanical arts have given them, can accomplish with ease more work than was performed by the whole of the cotton operatives of the United Kingdom, numbering about 43,000, who were engaged in the trade in 1760. If that be so, then the firm of Horrockses, Miller & Co. alone nearly quadruple the entire production of 125 years ago.

The Yard Works, where the main portion of the spinning and manufacturing processes of the firm are carried on, are situated on the higher side of the town, and form a collection of factory buildings of great extent. They comprise: the Yellow Factory, built in 1791 by John Horrocks; the Yard Spinning Mill, erected in 1796 on the site of the one that John Horrocks built in 1792, but which was afterwards burned down; the Yard Weaving Shed, put up in 1882, holding about a thousand looms; the large Spinning Shed, erected in 1875; the Field Spinning Mill, built in 1836; the Field Weaving Mill, with the Great Weaving Shed adjoining; and numerous other sheds, warehouses and buildings; to which may now be added the Soverign Mill, formerly worked by Messrs. Hollins Brothers. Then there is the Moss Mill at the other end of the town, about a mile distant; while the New Preston works, which are situated not far from the Yard factories, comprise a large spinning mill, a weaving shed of considerable extent, a recently built and very commodious shed for winding, warping, and sizing, and a handsome range of warehouse buildings. The whole of the works owned by Messrs. Horrockses, Miller and Co. cover nearly thirty acres of ground. They have in operation six mills and eight sheds, and employ 3,500 work-people. There are five powerful engines at the Yard Works, besides many smaller ones, the total horse-power being 4,500. The number of spindles is about 150,000; the number of looms 4,500. To give some idea of the immense power of production represented by these figures it may be stated that the firm use from 300 to 400 bales of cotton every week, and that they manufacture in the same period about 250 miles length of cloth, or, in the course of a year, a length of 13,000 miles, nearly sufficient to stretch from Preston to San Francisco and back again. The engines of the firm were at one time the finest in the North of England. In every department, indeed, their display of enterprise is remarkable. The "hands" have had good wages, and when other firms have brought down their prices Horrockses have been able to maintain their old rates.

As a consequence, they have had fewer disputes with their work-people than most other firms, although some very painful episodes in the modern history of Preston have occurred in connection with strikes in the cotton trade. In the great strike which took place in 1842, the guild year, when the town was kept for a great part of the year in a state of riotous ferment, the head of the firm of Horrockses, Miller and Co. was called upon to perform a very distressing duty. This was Samuel Horrocks, who was mayor that year. The manufacturing districts of Lancashire and Yorkshire were in a condition of deep distress, consequent upon the severe depression in trade; and what with the agitation created by the "Plug Rioters," who went about from mill to mill stopping the new machinery, the imaginary cause of all their troubles, and the excited clamour of the Chartists, who were then threatening to overturn the governing powers, the inhabitants of Preston had more than enough to occupy their attention. Preston—proud, aristocratic Preston—was one of the hot-beds of these industrial and political conflicts, and riot and bloodshed seemed daily imminent. The culminating point was reached on the night of Saturday, the 13th of August, when the rioters, after stopping several of the factories, made their way in great force to Lune Street, and showed a determination to continue their riotous proceedings. The mayor, the magistrates, and other local authorities met in consultation, and decided to call in the aid of the military. When the soldiers came the authorities confronted the rioters, and the mayor called upon them to disperse. They refused to do so, with the result that Mr. Horrocks, after reading the Riot Act, and finding the position of affairs still more threatening, gave the order for the soldiers to fire, an order which was only too promptly obeyed, and led to eight or nine persons being severely wounded, four of whom died, while others were permanently disabled. The marks of bullets fired on that unhappy occasion are still to be traced on the walls of the Corporation Arms Inn. It was an extreme measure, it must be admitted, but then the danger was extreme, and the probability is that still greater disaster and bloodshed was avoided by the action of Mr. Horrocks that night, which had the effect of clearing away from the town for a time the cloud of disaffection which for many months had hung over it like an Egyptian darkness. Since then riots have happily been unknown in Preston, although there have been far more serious disputes between capital and labour in the borough in later times. The great strike which lasted from October, 1853, to May, 1854, was perhaps the most lamentable in its effects upon the industrial community of Preston. During the six months that that strike lasted, it has been estimated that the loss of wages by the operatives was not less than £250,000, while the loss to the people generally must have been equal to £533,250; and after all the poverty and suffering which the dispute entailed, the work-people were compelled to give way.

Returning, however, to the Yard Works, we will endeavour to describe some of the leading features of the great factories devoted to the manufacture of Horrocks's famous cloths, beginning with the initial processes and following the fibre until it emerges from the loom a complete fabric. After wandering for a few hours from room to room, from warehouse to warehouse, and mill to mill; after ascending from bottom to top of a huge factory building by way of one hoist and descending by way of another; after passing through a succession of hoists, and a succession of mills, and a succession of sheds; after inspecting machine shops here, and joiners' shops there; after plunging into one shed where a thousand looms are all clicking and clacking in the mad endeavour to outstrip each other in noise and clangour, and into another where thousands of spindles are whirring and buzzing with deafening rapidity; after rushing into engine-houses where monster fly-wheels are revolving with a ponderous velocity that seems to shake the whole earth to its very foundations, and into boiler-houses where great fires are being fed every minute of the day with heaps of blackest coal, which they seem to swallow up in flame at the instant of inception; after staring up from below upon immense factory chimneys, which rise like gigantic monumental columns out of the maze of bricks and mortar, machinery, and hubbub, and staring down from giddy heights upon roofs of far-stretching sheds, great reservoirs of water, and, away beyond this busy industrial colony of from twenty to thirty acres, out upon the picturesque, wood-clad hills across the Ribble; seeing, feeling, hearing, experiencing all this, without sufficient time to sort it out into separate elements or divisions, the impression conveyed to the mind is certainly largely made up of wonder and bewilderment, and the pen may well be excused for halting when called upon to work the whole into an understandable, recognizable picture. Taking the processes as they come, however, and tracing the cotton fibre from the point of its arrival in the raw state at the Yard Works to the time when, as manufactured fabric ready for the market, it is sent out again; and taking a representative room, or shed, in each department, irrespective of its exact position in the many smoke-hued buildings which constitute this immense hive of industry, we may perhaps contrive to realize to some extent the general nature of the operations carried on by Messrs. Horrockses, Miller and Co.

First of all, we are taken through a series of rooms where the raw cotton lies piled up in mountainous heaps, just as it has been tumbled out of the bales. Two classes only of cotton are used in the manufacture of Horrockses' long-cloths, sheetings, and shirtings—the American and the Egyptian, which it is easy to distinguish by the brownness of the one and the whiteness of the other. Now it is a brown pile that we are called upon to inspect, now a white one, and now one in which the two sorts of cotton are blended, each classification being according to the special kind of goods into which it has to be converted. It looks the very symbol of peace, innocence, and repose, as it rests there in its virgin purity, ere yet it has got into the iron grasp of the relentless machines under which it is doomed shortly to writhe and struggle. It would seem, however, that the fibre is not quite so free from impurity as at the first glance it appears; for when we have our attention directed to the presence of bits of seed, and sand, and other non-fibrous odds and ends from the cotton fields, we can see that these things have somehow to be eliminated. The first stage of purification is accomplished by means of what is called the "opener," a machine which takes the cotton, beats it savagely, shakes its fibre loose, and throws it out in a much more presentable condition than when it first took it in hand. The "opener" is fed by a pneumatic tube, through which it is carried as it gets disentangled, the grosser impurities being deposited in the dirt-cells of the tube as it passes along. From the "opener," the partially cleansed cotton is passed forward to the "scutcher," which is a sort of improved "opener." It is a large machine of most ingenious construction. The cotton received from the "opener" is weighed out in stated quantities and placed upon a lattice creeper, which brings it into contact with a pair of small-fluted rollers, which transfer it to a double-bladed beater that is half-concealed in a cylinder, the bottom whereof consists of a grid through which the impurities fall. The beater makes some two thousand strokes per minute. A pair of slowly revolving dust cages are situated at the back of the machine, and into these the "lap" of cotton falls as it emerges. There are scutchers and scutchers, however; first scutchers, and second scutchers; but the same principle and the same purpose are manifest in all; they cleanse and purify, and deliver the cotton in the form of "laps," ready for the carding-room.

A room full of carding machines, such as can be seen at the Yard Works, is a sight to fill the uninitiated with wonder and amazement. They are huge, complicated masses of mechanical contrivances, and perform their various evolutions with a buzz, and a trembling, and dust-dissemination, which are not a little bewildering. There is no more important process in the entire cotton manufacture than this of carding; for it is not one operation alone that it performs, but has a multiplicity of duties imposed upon it, all of which it accomplishes with perfect reliability and promptitude. It has to complete such portions of the purifying work as may have escaped the "opener" and the "scutcher"; it is required to remove all the short fibres or "nep," whose presence would be a disturbing or depreciating influence; it is called upon to place all the fibres in straight parallel order; and, finally, it has to run the thick "laps" of cotton off into a gossamer-like film, depositing it in cans in the shape of pure, white, and beautiful "sliver." With what an array of rollers, cylinders, combs, teeth, wheels, and discs all this is done, could only be described in a work of a technical nature.

From the carding-room, the cotton "sliver" is transferred to the "drawing" department, where, for the first time, the fibre is submitted to the process of attenuation. A number of cans of "sliver" are placed in front of the machine, and the "slivers" are passed through a series of rollers, the speed of each pair of rollers being graduated from back to front. The second pair revolves one and a half times as fast as the first pair, while the third pair runs at four times the rate of the second; an ingenious arrangement by which the requisite amount of elongation is obtained. In connection with this machine, Messrs. Horrockses, Miller & Co. have an electrical stop-motion, the invention of Messrs. Howard & Bullough, of Accrington, successfully applied. It consists of a small magneto-electric machine, which is driven by a band or belt from the shafting driving the machinery. The electricity is conveyed from the generating machine to the frame by means of two rods, to each of which certain parts of the machine are connected; but the circuit is not completed. In the event of the "sliver" breaking, or becoming exhausted, or not performing its allotted task properly, or the can overflowing, the electrical circuit immediately receives completion, and the machine is stopped. This is one of the most successful adaptations of electrical science to mechanical industry, and supplies an indication of a new field of invention which may yield much in the future to aid the development of our manufactures. The numerous mishaps of which Messrs. Howard & Bullough's stop-motion takes such prompt cognizance had, before its introduction, to be continuously watched for by the operative, entailing a much greater amount of supervision than is now necessary.

Advancing by regular stages, we are next introduced to the "slubbing" department of the Yard Works. The "slubbing" frame is a machine of from sixty to eighty spindles, upon which small bobbins or tubes are placed, for the reception of the cotton in a state of further attenuation, being slightly twisted and drawn finer in its passage from the "sliver" stage in which it has come from the drawing-frame, where we last saw it. Then comes what is called the intermediate frame, which is a repetition of the slubbing process, and provides for the doubling and uniting of the two slubbing ends in one, while it draws them out to the proportion of one and produces a greater evenness of yarn. From the "intermediate" stage we pass to the last of the preparatory processes, that of "roving," where the cotton is further drawn out and wound on to smaller bobbins, ready for the "mule."

The "mule" spinning machinery of Messrs. Horrockses, Miller & Co. occupies a great deal of space, but is of the most improved pattern, and much more accommodatable than the machines in the development of which so many inventors of the last century were associated, but which had their best features added by Mr. Richard Roberts, of Manchester, from 1825 to 1830, when the Yard Works had been in existence for many years. "The first self-acting mule," writes Mr. Richard Marsden, editor of the *Textile Manufacturer*, "was one of the greatest triumphs of mechanical genius that has ever been achieved, and as a display of the power of the inventive faculty in man's nature, surpassed anything accomplished up to that time." This statement hardly requires even that limited qualification, as though great advances have since been made in many branches of mechanical industry, nothing yet surpasses the spinning mule in the number and variability of its actions, the admirable concert of its parts, or the excellent results achieved by it. To watch this machine, advancing and receding, with all its complex arrangement of shafts, wheels, levers, pulleys, ropes, and springs, perform its important functions of spinning the "rovings" into yarn, is to be amazed at the automatic perfection to which the machine has been brought. The "rovings" are fixed on the creel of the machine, and the ends are run through small guide wires, and passed through three pairs of drawing rollers. The back pair receives the ends of the rovings from the bobbin; the next pair takes it forward, with slightly accelerated motion; and the last pair, which runs at a much more rapid rate, "draws" it equally throughout. From this point the ends pass to the spindles, which, revolving at an enormous speed, twist the loose fibres together and form them into distinct threads. Meanwhile, the spindle carriage is being drawn away from the rollers, at a pace very slightly exceeding the rate at which the roving is coming forth, thus obtaining what is termed a "gain," which has the effect of removing all irregularities in the fineness of the thread. "The carriage, which is borne upon wheels, continues its outward progress," to quote the authority before-mentioned, "until it reaches the extremity of its traverse, which is sixty-three inches from the roller-beam, when the revolution of the spindle ceases, the drawing-rollers stop, and the backing-off commences. This process is the unwinding of the several turns of the yarn, extending from the top of the cop in process of formation to the summit of the spindle. As this proceeds, the faller-wire, which is placed over and guides the threads on the cop, is depressed; the counter-faller at the same time rising, the slack unwound from the spindles is taken up, and the threads are prevented from running into snarls. When the backing-off is completed, the carriage commences to run inwards—that is, towards the roller-beam—the spindles winding on the yarn at a uniform rate, but by means of a varying speed in their revolution, as the faller is guiding the thread upon the larger or smaller diameter of the cone of the cop. Immediately the winding is finished, the depressed faller rises, the counter-faller is put down, and the former actions recommence in the order described, and are repeated until the 'set' is completed—that is, the cops on each spindle are perfectly formed." Men and boys work these machines, travelling to and fro all the day long with the spindle carriage. So perfect of construction are the " mules " of the present day, however, that the labour of superintending their operations is far from being so fatiguing as it must have been in the time of Arkwright, Crompton and Hargreaves. In connection with this machine, Messrs. Platt Brothers & Co., of Oldham, whose celebrated machine works form the subject of an article in another part of this volume, have patented an invention called the " automatic nosing motion," which regulates the winding in a greatly improved manner. The winding is more uniform in its action, the yarn is subjected to less strain, and it is kept free from snarls. But there are many other processes yet for the cotton to go through before it can be sent forth to the world as complete cloth. Having been converted into yarn, it goes one way to be made into warps, and another to be made into weft. That intended for the warp is passed on to the winding and warping room, where it is wound round a beam. When on the beam it is taken to the sizing room, and six at a time are unwound through a heated starchy mixture which serves to impart to the warp strength enough to stand the wear and tear of the loom, to which it is sent after having been put into the harness of " reeds and healds," whose office it is to keep the ends in perfect regularity and form the sheath through which the shuttle that drags the weft across the loom has to travel.

All the mechanical processes are done with now, except the final one of weaving, with which nearly everybody is familiar in one form or another. At few places, however, can the business of weaving be seen in progress on such a scale as at the works of Messrs. Horrockses, Miller & Co. They have several large sheds devoted exclusively to weaving, one of them holding about a thousand looms, and others being nearly as large. Walking out of the open air into the principal weaving shed, one is literally struck dumb with the noise that so suddenly assails the ear, for it is useless attempting to give utterance to one's thoughts, or to try to understand the speech of any one else, who is bold enough to make the experiment of speaking to you, the clatter and clamour, the buzz and confusion which seems to reign being too great for any interchanges of this description. A thousand looms! all banging their shuttles from side to side with lightning-like rapidity. A thousand looms! with a thousand gleaming sheets of white cotton growing into cloth in them. A thousand looms! tended by neatly-dressed women and healthy-looking men, who have time enough to take stock of any visitors that may rudely rush in upon them, despite the fact that each weaver has the supervision of three or four looms. The real labour is performed by the machines, these do the hard work; the men, women and girls simply keep a watchful eye upon them just to keep the course clear for them against broken ends, failure of weft, or other accidents to warp or woof. The machines will not fail to do their part, if only the material they have got to manipulate will hold out.

The conditions of labour in the cotton trade are altogether changed in these days from what they were before the era of invention. According to Dr. Aitkin, "An eminent manufacturer of that age used to be in his warehouse before six in the morning, accompanied by his children and apprentices. At seven they all came in to breakfast, which consisted of one large dish of water-pottage, made of oatmeal, water, and a little salt, boiled thick, and poured into a dish; at the side was a pan or basin of milk, and the master and apprentices, each with a wooden spoon in his hand, without loss of time dipped into the same dish, and thence into the milk pan, and as soon as it was finished, they all returned to their work." A social and industrial revolution has taken place since then, and under our present larger system of trading the manufacturer of cotton has become a power in the land, the "cotton lords," as was instanced even so far back as the time of John Horrocks, having proved themselves no unworthy rivals of the older aristocracy of birth and landed proprietorship. Preston, as we have seen, has undergone in its social bearing, as marked a change as that which has been experienced by the trade which it now fosters and is so proud of. The names of the Horrockses, the Millers, the Hermons, the Hollinses, are names which mean more to Preston now, than all the showy grandeur which gave them empty delight in the days that are gone. When "the old Earl of Derby," as he was called, who married as his second wife, Miss Farren the famous actress, kept high revel at Patten house, in Church Street, Preston, and at Preston fought his main of cocks with General Yates, it was, according to the tastes and humour of the time, considered that Preston was honoured above all other towns in the north. They had other things to fight about in the capital of the Duchy later on, and some of the names we have mentioned as representing the peerage of industry, were associated with the conflict. Employers and employed, however, have since then, acknowledged an identity of interest, and it is to be hoped, that the Sovereign Mill, which now forms part of the works of Horrockses, Miller and Co., will never again have to witness such scenes as were enacted in it during the long strike of 1853-4. Mr. Hollins (father of Mr. Frank Hollins) kept the mill open. A contributor to "Household Words," who was at the time commissioned to go down to report on the strike for Dickens, made the following reference to this: "It is a very beautiful mill, containing a large amount of valuable machinery, to which some recent ingenious improvements have been added. Four hundred people could find employment in it; there were eighty-five at work, of whom five had 'come in' that morning. They looked, amongst the vast array of motionless power-looms, like 'a few remaining leaves in a wintry forest.' They were protected by the police (very prudently not obtruded on the scenes I have described), and were stared at every day when they came out, by a crowd which had never been large in reference to the numbers on strike, and diminished to a score or two. One policeman at the door sufficed to keep order then. These eighty-five were people of exceedingly decent appearance, chiefly women, and were evidently, not in the least uneasy for themselves. I heard of one girl among them, and only one, who had been hustled and struck in a dark street." Since then, masters and men have been on more amicable terms, and no strike of any importance, except one in 1877, that lasted two months, has occurred in Preston. In 1853, the ballad-singers went about chanting their songs of the strike, in which the point of view of the operatives was clearly, though not very poetically, put. One of the "Ten Per Cent. Songs," as they were called, had a verse that ran thus:

"In eighteen forty-seven, my boys,
  I am sorry for to say,
They took from us the ten per cent.
  Without so much delay;
And now we want it back again,
  Our masters, in a pout,
Said they would not grant it us,
  So we're every one locked out."

There was a chorus, too, which may be worth quotation. This was it:

"So now, my boys, don't daunted be,
  But stand out to the fray;
We ne'er shall yield, nor quit the field,
  Until we've won the day."

This was all very well as a chorus, but it was a failure as a prophecy, as it turned out.

Preston has received so much benefit at the hands of her cotton magnates of late years that she is not likely soon to quarrel with them again without good and sufficient cause. Trade will fluctuate, and periods of depression and prosperity will alternate, like the storms and calms of the sea; but it has become a recognized truth that it is not the employed alone who have to bear the brunt of hard times, but that the masters have to be foremost in the struggle, and that upon the sympathy and support of their work-people success or failure often depends.

While the chimneys at Yard Works are kept smoking, while the looms and spindles are kept well employed, and while the fame of "Horrockses" cotton retains its pre-eminence over the world, Preston will always have good reason to hold to her old designation of "proud Preston," and, judging from the strong organization which now sways the destinies of this famous firm, its future will not be less distinguished than the past. At the guild celebration of 1882, when the Duke of Cambridge graced the occasion with his presence, and a week of festivity in honour of trade—trade as Preston knows it in the present day, not as in the ancient times, when the guild was established—was indulged in, the most imposing display of the week was the textile industries procession, representing the staple trade of the town. In this procession the firm of Horrockses, Miller & Co. naturally occupied a very prominent position, as the oldest and largest firm in the borough. A model of all their mills and sheds, fixed on a gaily decorated waggon, was exhibited, and as it moved along with the procession, was greatly cheered by the multitude assembled along the line of route. What the guild of 1902 will have to show in connection with the firm of Horrockses, Miller & Co., it is, of course, impossible to predict, but already there are signs of still greater activity and increase of influence on the part of the firm, and it will be strange indeed if, when the next guild comes round, they should not still possess the leading position which has been theirs for so long a period.

In July, 1885, the Prince of Wales honoured Preston with a visit, for the purpose of attending the Royal Agricultural Show which was held there that year, and as His Royal Highness takes a deep interest in the progress of the national industries as well as in agriculture, he did not fail to avail himself of the opportunity then presented of inspecting the works of Messrs. Horrockses, Miller & Co., which are as completely representative of the cotton manufactures of Lancashire as any concern that could have been selected. That Preston does not intend to be left behind in the march of progress is evidenced not only by the continued pre-eminence of such firms as that of Horrockses, Miller & Co. as far as regards its cotton industries, but by the enterprise and energy of its inhabitants in extending the importance of its industries generally.

One of the duties which the Prince of Wales had the pleasure of performing while in Preston was the laying of the foundation of a new dock, the projecting of which may be taken as an indication that Preston intends to make some attempt to regain something of her former position as a Lancashire shipping port, for, although she will find it impossible ever again to hold the distinction of being the principal shipping station in Lancashire—as she did in the time of Charles I. when she paid more than double the amount of ship-money that was paid by Liverpool, and one-third more than Lancaster—she may still hope, with the navigability of the Ribble improved, to increase her maritime traffic to such an extent as to make it an important factor in the promotion of her industrial greatness.

THE MINTONS OF STOKE-UPON-TRENT.

THE MINTONS OF STOKE-UPON-TRENT.

THE group of towns which form the district known as "The Potteries," presents no more interesting feature than the works of the Mintons, at Stoke-upon-Trent, which are of vast extent, and have a history that carries us back to the early years of the Ceramic manufacture in this country. The name of Minton has been prominent in the annals of Stoke-upon-Trent since the concluding decade of the last century, when the making of pots was much less of an art than it is to-day, and as far as regarded the cheaper specimens of pottery little had been done to combine the beautiful with the useful. Josiah Wedgwood, at the neighbouring town of Burslem, had, it is true, brought to bear upon the potter's art an amount of energy and genius which had yielded brilliant results, and given an impetus to the trade that put all previous efforts into the shade, but there was yet a great deal to be done before the manufacture could take rank as one of the important industries of England. For centuries the potters of the Continent had been famed for the choice works of art which they had produced from the clay, but it was not until Wedgwood came upon the scene, and by his inventive ability and classic taste established a reputation for a special ware, that Staffordshire was able to compete at all with foreign nations in the more artistic branches of the potter's craft. Rude samples of dishes and plaques had been made in the locality before then by Thomas Sens, Thomas Toft, and William Taylor, of Burslem; but Wedgwood's "first teapot," a vessel moulded in the ordinary ochreous clay of the district, and decorated with a few twining leaves in coloured relief, was as distinct an advance upon the work of these early potters as Wedgwood's own special classical ware—the ware by which his name became famous, and which is now so precious in the eyes of collectors—was to his "first teapot." When Wedgwood began his career, indeed, English potters were in a bad way; they had reduced their trade to a very low ebb by competing with each other in cheapness of production instead of in artistic excellence, and the markets had, as a consequence, become glutted with inferior articles. The first English potteries would appear to have been at Stratford-le-Bow and at Fulham, and the first English potter's ware the Elizabethan, which was of a very light and inartificial character. It came about in this way. The old workers in gold and silver found their trade on the decline, through the introduction of so much foreign painted ware, so, reduced to sheer desperation, they had recourse to a cheaper rivalry which they hoped would frighten their competitors away. They made a liquid paste, which they poured into their moulds instead of metal, burned it dry, and produced, after evaporation of the water, extremely light earthen jugs and pots of the same patterns previously in use for vessels manufactured of the precious metals. In the manufacture of fine ware, however, nothing successful could be accomplished until the use of calcined flint was made known, which was one of those accidental discoveries of which so many examples are to be found in the history of invention. It is related that, in the year 1720, while the younger Astbury

—the precursor of Wedgwood—was riding to London, he had occasion, at Dunstable, to seek a remedy for a disorder in his horse's eyes, when the ostler of the inn, by burning a flint, reduced it to a fine powder, which he blew into them. The potter, observing the beautiful white colour of the flint after calcination, instantly conceived the use to which it might be applied in his art, and, on his return home, he introduced burnt flint into his ware, with the most satisfactory results.

Josiah Wedgwood was the pioneer and hero of the Staffordshire renaissance which followed; he set to work on entirely new lines, and by putting himself in rivalry with the higher workers in the art soon raised the native manufacture to a position of importance that could stand comparisons with the the art potteries of France and Germany. He was born at Burslem, in 1730, and at eleven years of age was employed as a thrower in his brother's pottery. A severe attack of small-pox, which left him with a lameness in one leg (which was afterwards amputated), compelled him to quit the wheel, and, migrating to Stoke, he carried on business there for a short time with one Harrison, making his first experiments then in the art of ornamental pottery. A little later he left Harrison and joined a Mr. Wheildon, and in 1754 we find him in business at the same place, as a manufacturer of spoons, knife-handles, table and other plates, and sundry "small crocks," some of which articles were made in imitation of agate, tortoise-shell, jasper, and porphyry; but Wheildon had such small confidence in the new-fangled ideas which emanated from Wedgwood's busy brain that it was not long before the connection was dissolved, and, in 1759, Wedgwood returned to Burslem, and, in a small thatched factory erected upon the site now occupied by the market-house, began the making of ornamental ware of an improved description, which soon attracted attention, and procured for him an order for a complete table-service for Queen Charlotte and the appointment of "Potter to the Queen." This cream coloured-ware—the "Queen's ware," as it was called—had a simple cane-coloured surface, the natural colour produced from the burning of the fine grey marl found between the coal strata. Wedgwood afterwards added a coloured rim, under a tolerable glaze; then he learnt to cover the whole surface with a pattern, without adding materially to the cost of the article. It soon became popular, and not only was largely bought in England, but found a ready market abroad. "Its excellent workmanship," wrote a foreigner at that period, "its solidity, the advantage which it possesses of sustaining the action of fire; its fine glaze, impenetrable to acids, the beauty and convenience of its form, and the cheapness of its price, have given rise to a commerce so active and so universal, that in travelling from Paris to Petersburg, from Amsterdam to the furthest port of Sweden, and from Dunkirk to the extremity of the south of France, one is served at every inn with Wedgwood ware. Spain, Portugal and Italy are supplied with it, and vessels are loaded with it for the East Indies, the West Indies, and the continent of America."

Thomas Minton, the founder of the firm which forms the subject of our present paper, was born at Wyll Cop, in Shropshire, in the year 1765. Wedgwood had then been established in business several years, and the pottery trade of Great Britain was fast rising into prominence and showing signs of a vigorous vitality. Thomas Minton, who was educated at the Shrewsbury Grammar

School, was apprenticed to an engraver at the Caughley China Works, Broseley, on quitting school, and was thus drawn into direct contact with the ceramic manufacture, and gained an experience and a knowledge which stood him in good stead in after life. On the expiration of the term of his apprenticeship he remained on at the Caughley works, and continued there in the capacity of engraver for some years. He was of a plodding and careful disposition, and contrived, as time went on, to save a little money, all the while harbouring the notion of one day applying it to the purpose of establishing himself in business on his own account. The opportunity was somewhat slow in coming, for we find him sticking to his engraving business for a considerable period after he had served his time at the Caughley works. He was always ambitious, and occupied his mind largely with plans for improving his position. He tried London for a while as a field of operation, and worked there for the well-known Josiah Spode, acquiring further experience in his own particular business, but by no means satisfying his aspirations. Staffordshire seemed still to possess his heart, for it was in the pottery work in which he had first come into touch with the industrial world that he saw greater possibilities even than were opened before him in the vast world of London. It was in London that he found a wife, however, but it was not there that he resolved to settle down with her, for not long after his marriage he left the service of Mr. Spode and returned to Staffordshire. This was in 1789, when the first outbreak of the revolutionary flame in France was spreading alarm far and wide. Thomas Minton did not trouble himself much with these things, but in his quiet, steadfast way resumed his labours as an engraver at Stoke-upon-Trent; but this time it was on his own account, and not as the servant of another. He prospered fairly well, and saved more money, and in 1793 there came that tide in his affairs which he had the good sense to avail himself of, and which, as was afterwards amply proved, "led on to fortune." He purchased a small plot of land and built a modest factory upon it, and in this building started the manufacture of earthenware. The structure comprised one "bisque" and one "glost" oven, with a slip house for preparing the clay, and only such other buildings and appliances as were necessary for the carrying on of an unambitious business. Thomas Minton believed in "beginning at the beginning," not in making a starting leap for the higher positions and coming to the ground broken and humiliated. He had seen too many of these mistakes made to have any desire to imitate them. He did not aim at being another Wedgwood, but he did aim at turning out good, serviceable, well-made articles, and this he accomplished so satisfactorily to himself and the public that the name of Minton soon grew to be of significance in the trade. So matters went on steadily and prosperously for a number of years, and Thomas Minton established a business which yielded him a good profit and an assured position.

In 1806, Thomas Minton's second son, Herbert, then only fourteen years of age, was brought into the business, and, with an ability far beyond his years, took an active part in the working of the concern. After two years passed in obtaining a knowledge of the various operations connected with the manufacture, Herbert Minton, at the age of sixteen, was sent out as a traveller, and represented the firm both in London and the provinces, showing so much determination and capacity that he worked up a connection which had the effect of largely increasing the business of the firm. It was now that Thomas Minton found it expedient to make new departures in the processes of manufacture, as well as to extend his workshops, for the new force which his son had introduced into the firm brought them not only abreast with the times in the potters' art, but rendered it necessary for them to take upon themselves the work of leading the public taste. For this purpose they employed the best skill that they could command; and on the suggestion of Herbert Minton, who went out into the world and noted every detail of the progress that was being made in the ceramic manufacture, they effected many improvements. The making of semi-transparent porcelain was undertaken by the firm in 1821, and a few years afterwards they added the manufacture of china to the branches of business carried on by them, many of the most skilful artists from the famous works at Derby being engaged by Mr. Herbert Minton to instruct his workpeople in the making of what, to them, was a new ware.

As far as regarded the manufacture of porcelain, England had, up to that time, been sadly behind continental nations. The Chinese and Japanese were in the field with choice specimens of porcelain centuries before Europe had taken up the manufacture. The first European porcelain was made at Dresden. John Frederick Böttcher, while experimenting in search of the philosopher's stone in the early years of the eighteenth century, made some crucibles which, unexpectedly, turned out to bear a strong resemblance to the porcelain imported from the Orient by the Portuguese. Augustus II., Elector of Saxony, interested himself in Böttcher's labours, and ultimately, in 1710, established the great manufactory at Meissen, appointing Böttcher director. A particular description of clay was necessary, however, to the making of the finer kinds of porcelain, and this was discovered by accident by John Schnorr, a rich ironmaster. Schnorr was riding near Clue, when he noticed his horse's feet stuck from time to time in a soft white earth. He alighted and examined it, and his first thought was that it would make an excellent substitute for flour, as hair-powder. Such, indeed, was the use to which he put it, and "Schnorr's white earth" grew into great favour, and yielded its discoverer much profit.

Böttcher, amongst others, patronised it, for every one wore powdered wigs in those days, and his observant eye soon perceived something far more potent in it than mere hair-powder. He submitted it to a series of tests, and at length concluded that it was the very thing that was wanted to perfect his porcelain. Men began secret experiments at the factory, the earth being conveyed to the works in sealed barrels, and every workman being sworn never to reveal the nature of the various operations. "Dumb till Death" was the terrible inscription placed in all the workshops, and imprisonment for life was prescribed as the punishment for any offence against this edict. But, in spite of all these precautions, the secret oozed out, and before long many rival establishments were set up in various parts of Europe. French porcelain was first made at St. Cloud, but perfected at Sèvres; here again the accidental discovery of the required earth caused the establishment of the manufacture. The tradition is that the wife of a poor surgeon came upon a white, unctuous earth in a ravine near the town, and took some of it home, under the impression that it would serve the purpose of soap. Her husband had the sample examined by a chemist, who pronounced it to be such an earth as would yield excellent results in the porcelain manufacture; and from that small beginning, the hard porcelain manufacture at Sèvres was established. The surgeon's wife was living in 1825, and became very poor; but on her condition being represented to the king, a small pension was granted to her. The first porcelain made in England was called Gomroom-ware, and was manufactured at Chelsea. It was so called from the fact of the earliest trade of the English East India Company being from an establishment formed at the Port of Gombron, opposite to Ormus, in the Persian Gulf, and not with India and China direct. Dr. Martin Lester thought the Chelsea Gomroom-ware, in some respects, superior to that of the Chinese, inasmuch as "our men were better masters of the art of painting than the Chinese." Dr. Johnson was at one time afflicted with the porcelain craze, and used to spend whole days at the Chelsea factory, in the belief that he had ideas for improving the pottery. "He was accordingly accustomed to go down with his housekeeper twice a week, and stayed the whole day, she carrying a basket of provisions with her." It is added, though, that the lexicographer's pots invariably tumbled to pieces in the baking; the rôle of the English Palissy was not for him. The Chelsea porcelain manufactory did not long survive the death of its chief patron, George II.; it being shortly afterwards merged in the Derby porcelain works.

The Mintons took up the porcelain manufacture in great earnest, when once they had made up their minds to it. Thomas Minton died in 1836, and Herbert Minton, who had temporarily retired from the firm in 1828, devoted himself to the business with all his old energy, Mr. John Boyle being associated with him in the partnership, and afterwards Mr. Hollins. In 1842 the reconstituted firm added Parian ware to their manufactures, and in 1849, Mr. Minton, with the assistance of Mr. Arnoux, the art director of Mintons, succeeded in making a hard porcelain which was pronounced to be superior to that of Meissen or Berlin. The firm were for ever on the alert for novelties, and imported into their business an amount of inventive skill which enabled them in certain special departments to out-distance all rivals. In 1849, while

Mr. Herbert Minton was at Rouen, his attention was attracted by some common flower pots, with a green opaque glaze, which seemed to him capable of being improved upon. To begin with, the material was very different from the ordinary earthenware pots made in England; and although altogether wanting in fineness and finish, it suggested fresh possibilities to Mr. Minton's active brain, and set him wondering how this rough material could be utilized and refined into something in which the original features should be preserved, while a new artistic element should be added to give force, form, beauty, and consistency to the whole. He returned home full of his discovery, which he explained with all due elaboration and clearness to Mr. Arnoux, and requested that gentleman to carry out the ideas he had propounded. Mr. Arnoux, infected with the earnestness and zeal of his employer, set about the task with great energy, with the result that, after a series of experiments extending over a period of several months, a beautiful ware was produced to which the name of English Majolica was given. This was a great surprise to the pottery world, and made something of a sensation. The first specimens of the ware which Mintons manufactured were in the shape of handsome vases; and in the Great Exhibition of 1851 they exhibited a number of these as a trophy, which gained universal admiration. The Princess of Prussia, now Empress of Germany, bought the entire collection immediately after the opening of the Exhibition, and orders for reproductions crowded in upon the firm thick and fast. For a time English Majolica was the rage; it became the fashion, and once again there was a distinct stride effected in the making of picturesque and artistic pottery in this country. The firm found it necessary to establish a special department for the manufacture of the new ware, and from that time to this the demand for it has continued in an ever-increasing degree. Time was when Wedgwood had secured the services of some of the great artists of his day in making designs for him—John Bacon and John Flaxman amongst them—and now Messrs. Minton called in to their aid the best artists of their time, and Marochetti, Carrier, Jeannest, and others gave them a series of designs which were reproduced with great fidelity, and served to make English Majolica famous. At the Paris

Exhibition of 1855 the show of this ware made by Mintons was one of the most admired displays in the entire collection, and the beautiful objects of art there gathered together, as representing the celebrated Staffordshire firm, were eagerly bought up, amateurs offering large prices to secure the coveted objects. The ordeal of trial had now been safely passed, and wherever artistic pottery was to be found, the English Majolica manufactured by Messrs. Minton made its way and held its own.

It may not be out of place, seeing the importance of this ware and the development of which it has been the result, to describe in what particulars it differs from the French and Italian Majolica. A calcareous clay, containing large quantities of carbonate of lime, which requires very gentle heat, is used in the manufacture of the French and Italian wares, but there is no geological formation in this country in which such clay is to be met with; consequently, Mintons had to set to work to find materials that would yield the best possible substitute for it. This they discovered in the marl which is found in abundance in certain coal measures, alternating with layers of coal and ironstone. When deprived of the ironstone, it fires to a light buff colour, and is of great density. It stands the frost and resists breakage better than any other ware. The characteristic of Mintons' Majolica is the opacity of the enamel laid on the surface. If the coloured glaze had been transparent the ware would have looked like Palissy ware, or the English tortoise-shell ware, and there would have been no novelty. The process consequently consists in employing hard coloured enamels, sufficiently opaque to hide the coloured body on which they are laid. Blue, turquoise, green, white, and all kinds of enamels are then prepared and melted, then ground finely in water and applied with a brush to a good thickness on the biscuit of the ware, care being taken to change the enamel according to the requirements of the decorator. When the pieces are coated all over and dried, the colours adhere to the surface, but they are powdery and could be easily brushed off. The firing causes them to melt on the surface of the ware, and to come out with all their depth and vigour. Many difficulties had to be surmounted before the various processes necessary to the successful production of this ware could be properly adjusted. The old Italian ovens, which were fired with wood, were found too expensive, so very large kilns were adopted, of the form of a horizontal cylinder, in which the ware was arranged on fire-clay shelves so as to have plenty of air around them. The flame circulates in such a way that no portion of it, nor any smoke, comes in contact with the pieces.

Referring once more to the *personnel* of the firm, it should be stated that in 1849, Mr. Colin Minton Campbell, a nephew of Mr. Minton's, became a member of the partnership, and in the able and energetic manner in which he assisted the concern, proved himself to be possessed of no small share of the business capacity, skill, and shrewdness of the founder of the firm, and of his son Herbert. The latter died in 1858, after which the chief duties connected with the management and control of this extensive business devolved upon Mr. Colin Minton Campbell. Until 1868 the partners were Mr. Campbell and Mr. Hollins, and then Mr. Hollins retired. Mr. Campbell was now joined by his cousins, Mr. Thomas Minton and Mr. Herbert Minton, great-grandsons of the founder of the firm, and these three gentlemen constituted the partnership from that time down to the year 1883, when the undertaking was converted into a limited liability company under the title of "Mintons, Limited." All the three partners took up positions on the directorate of the new company—Mr. Colin Minton Campbell as an honorary director, Mr. Thomas Minton as chairman, and Mr. Herbert Minton as one of the managing directors; Mr. Herbert Minton Robinson, who also acts as secretary, being another. Mr. Colin Minton Campbell died on the 8th February, 1885.

The achievements of the several talented and able gentlemen who have had the building up of the fame and prosperity of this notable firm of potters will perhaps be best understood and realized by a description of the works as they at present stand. In private life these eminent workers in clay have won in a large measure the respect, esteem, and affection of those by whom they have been best known; their public record comprises many honourable incidents in which their largeness of heart and clearness of head have been strongly manifested; but, above and beyond everything else, they have been men of business, whose hearts and souls have been centred in the interesting work upon which it has been their happiness to be engaged, and it is in that business, in the condition in which it exists to-day—developed and perfected by their abilities—that we find the completest reflex of their lives and characters.

Before touching upon the processes of manufacture it will be advisable, in the interest of the uninitiated, to say something concerning the raw materials upon which the various operations have to be brought to bear. Clay is, of course, the material which forms the foundation of all articles of pottery, whether made at Mintons' or elsewhere, whether in Great Britain, by the highest skill that money can command, or in New Mexico, by the rude intelligence of the Red Indians, who probably are no further advanced in the ceramic art than were their forefathers of a period anterior to the discovery of the American continent by Columbus. Unfortunately for Staffordshire, the clay necessary for the production of the finer kinds of pottery is not indigenous to the locality. The only clay that the soil of Staffordshire yields is a coarse kind, fitted but for the making of common ware and seggars; the potters of Stoke-upon-Trent have therefore to import all their finer clays from a distance. Some 16,000 tons of Cornish clay, mostly from the neighbourhood of St. Austell, are used every year in the Staffordshire potteries. This Cornish clay—or china clay, as it is called—is composed of silica and alumina, in about the proportions of forty of alumina and sixty of silica. Then there is blue clay, which comes from Poole, in Dorsetshire, and is of a greyish colour, but turns perfectly white when fired. This clay is less liable to crack than any other, and is used for the purpose of giving a certain solidity to the body. Its components are the same as those of china clay, only that the alumina is not present in quite so large a proportion. The potteries absorb not less than 60,000 tons of blue clay per annum. Flint comes next in order among the materials used in the pottery manufacture. This substance is, as every one knows, pure silica, and has to undergo the process of calcining before it can be manipulated by the potter, after which it is ground to the required degree of fineness in a mill with water. In the course of a year Staffordshire consumes some 40,000 tons of this material. There is about the same quantity of Cornish stone used. This does not require grinding. When it has been decomposed by exposure to the air it is easily worked up. Its constituent parts are kaolin, or china clay, undecomposed felspar, and quartz. Last on the list of raw materials stand bones, of which the manufacturers of porcelain use large quantities. Bones intended for the potter's use are first of all calcined so as to secure the destruction of all organic elements, and leave only the mineral ash (phosphate of lime), carbonate of lime, and a little magnesia, in the form of a perfectly white substance. This ash is then ground under water, and afterwards converted into a paste. Such are the principal raw materials brought into use in the making of pottery.

The materials being there, they have, in the first place, to be reduced to a proper consistency by being submitted to the grinding or crushing process. Many firms of potters have this done for them by people who engage in this one business alone, but Mintons do not put any of their processes into commission, but perform them all themselves. A visit to their mill shows an array of stones, some of which are used for grinding flint and Cornish stone, while others are devoted to the grinding of the materials for the various glazes and the later stages of manufacture. Under the same roof there is the colour mill, which has twenty-eight pans containing granite mullers, used for grinding the various colours. Then there is a very special and a very particular mill, which is kept strictly guarded, and is always under lock and key, where they grind the gold used in ornamentation, which is received at the works in the shape of grains, just as washed out. A powerful engine supplies the motive-power for driving the machinery of these mills, two large tubular boilers supplying the steam. All the raw materials used by Messrs. Minton are stored up on the banks of the canal close by, whence they are transported to the mills as needed, by means of carts.

It is in what is called the Slip House, that the initial processes of the manufacture are to be seen in operation. First of all, the due proportions of blue clay, flint, and Cornish china clay, are measured out into a vat with a sufficient quantity of water, and by means of vertical "blungers" it is worked into a mass of the consistency of cream, and of uniform density. The "blungers," which are worked by steam-power, are used both in the preparation of the slip for earthenware, and in the preparation of china slip. From the "blungers" the slip is passed into troughs, and strained through sieves of lawn varying in fineness from 64 to 112 threads to the inch, and thence into receptacles termed "arks," which are ready for its reception in a room immediately underneath the slip-house. It is particularly interesting to the outsider to watch the mixing of the various solutions in proportions determined by the character of the ware to be produced. This is done in what is called the mixing tub, a vessel which is fitted at the sides with gauges to regulate the proportions of the materials used. After the mixing, the slip or clay solution has to be deprived of all superfluous water, which is accomplished by forcing it into strong cotton bags by means of steam-pumps, and afterwards submitting the bags to heavy pressure between two fluted surfaces, the water being forced out through the interstices of the cloth, leaving the clay in the bags in a solid condition. After receiving treatment of a kindred nature at the pug mills, the clay may be considered to have passed all the preliminary stages and to be ready for the hands of the potter.

The clay has to undergo three separate and distinct processes in being shaped into its required form—throwing, pressing, and casting. In the throwing department, we are introduced to the potter's wheel, an implement which is in its main features the same to-day that it was four thousand years ago, when the Egyptians made pottery, as we have seen it depicted on the ancient pictorial records of stone which have remained through the ages as a connecting-link between the remote past and the present. The difference between the old mode of working the wheel and the new is simply that the modern thrower has the advantage of steam-power for driving the wheel, the speed of which he controls by means of his foot, whereas in olden times, the workman had to rely solely on manual labour. As we observe the thrower at Mintons' establishment, we see lumps of clay weighed out to him by the girl-assistant who works by his side, and as he takes it from her, he places it on the horizontal wheel that is performing its rapid revolutions before him, and, with a dexterity that seems nothing less than marvellous, manipulates it in the most skilful manner, until it assumes the precise form that he desires, being transformed from a dull mass of clay to the most elegant article of pottery in a wonderfully short space of time. The object having now assumed its first shapings at the hands of the thrower, it is passed forward to the turner, who fixes it upon a lathe, and brings certain tools to bear upon it, that have the effect of removing all superfluous substances and rendering its outline more strictly correct.

The Handling Room has next to be visited. It is here that a number of workmen are employed in making handles for cups and similar articles, spouts for teapots, and so forth. If the handles are intended to be of an ornamental character, they have to be pressed in plaster moulds, but if only required to be plain, are made by forcing the clay through a brass tube of the necessary shape, thus forming a kind of clay pipe, which is cut into lengths, bent to the desired shape, and affixed to the article by means of a little liquid slip which is applied by a camel-hair pencil. This operation fixes the handle so firmly to the parent article, that a separation at the joining point very seldom takes place.

The Pressing Shops come next in order for visitation. Here we find some of the larger pieces of pottery being made by workmen who work with mallets, and beat the clay out into pancake-shape, before proceeding to give it its required form. As in the throwing department, the clay is weighed out in certain quantities to the operator, according to the weight and nature of the article intended to be produced, and when it has been flattened out by the mallet into what is technically termed a "bat," of uniform thickness, it is placed on a plaster mould, fixed on a wheel known as a "jigger;" and as this rapidly revolves, the workman presses the clay with a tool called a "profile" and gives it the required shape. In the case of octagon-shaped plates, the article is first pressed in a mould, trimmed to give the necessary angles to the outer edge, and then finished on the "jigger." Plaster moulds are also used in making soup bowls, wash basins, pie dishes, and other large pieces, but the pressing is done by the workman "dabbing" as it were, the plastic clay into the shape of the mould by means of a wet sponge—a "bat" of suitable thickness being, of course, prepared in the first instance. This process requires a great amount of care and practice, for should the piece be made thicker in one part than another, it is almost certain to crack in the drying or firing, owing to the unequal expansion and contraction of the clay. When we come to the pressing rooms where the largest articles of all are made, we have our attention drawn to the more complicated processes. In some instances, the moulds are made in separate parts, which are so arranged, that they can be removed one by one without disturbing the still soft figure. There are cases, however, in which this is not practicable, and the pieces have to be moulded separately, and afterwards joined together while the clay is still soft. This requires a neat and skilful hand to accomplish it satisfactorily, the parts having to be adjusted so neatly, that no trace of the patching will appear upon the surface of the finished article. The joints are concealed in a most ingenious manner. The various sections are secured in their places by means of a strap or riband, and the presser passes his finger up each joining so as to make a shallow groove, a thin roll of clay being inserted in the groove and worked carefully into the mass with the fingers, the whole being made smooth with a moist leather. The mould and its contents are then set aside until the clay is firm enough to receive a polish from a flexible plate of horn. In this fashion are made some of the large Majolica vases, and such figures as those of storks, herons, cranes, peacocks, &c.

The ware having been thus formed, by throwing or pressing, it is passed forward into the drying rooms, which occupy the central portions of the shops, and are very ready of access. In some cases, the drying rooms have a series of shelves which revolve on a central pivot, so that each section of the interior can in time be brought in front of the doorway, and the ware placed on the shelves; but in the majority of instances, there are sliding doors opening upon shelving composed of steam-pipes, and on these the ware is placed.

As we continue our progress through the works we find the processes becoming more and more artistic as we advance. We are introduced to the Figure-making shops, at which point we take our leave of the commoner aspects of pottery work, and begin to breathe an atmosphere of art, wherein we find a multitude of examples of classical objects—busts, statuettes, and groups—copies of famous works of art, such as the Greek Slave of Hiram Powers, the Prometheus and the Hebe of Canova, the Imogene and the Abyssinian Slave of Bell, and other celebrated masterpieces of sculpture. The process of manufacture in this important branch of Messrs. Mintons' works is as follows:—The various sections of the mould are placed together and bound round with a strap, in the first instance; the liquid clay, or slip, is then poured into the mould until it is full. It is then left to stand for a few minutes, when the plaster mould absorbs the water from the slip which is brought into immediate contact with it, and deposits, as it were, the clay on the inner surface. When the operator judges that sufficient has adhered to the interior of the plaster mould, he pours off the superfluous slip, leaving the mould lined with the clay from which the water has been absorbed by the plaster. The piece is then left to harden, during which process it contracts very considerably, and it is removed from the mould when it is deemed safe to perform that operation. Connected with this branch of the business, is the department devoted to the making of raised flowers, foliage, and other objects in relief used in the ornamentation of vases and other large pieces.

We now proceed to the "greenhouses," as they are styled, where all ware in its "green" state is dried, prior to being submitted to the most crucial process of all—the firing. This important operation is performed in the "biscuit ovens," as they are technically described, or kilns. The ware is placed in large pans or cases, called "seggars," made from the clay found in the neighbourhood, and when the "seggars" have received their contents, they are piled one above another in the ovens, the one above forming the cover of the one below. The ovens are 19 feet in diameter, and the same in height to the apex of the dome. At first the fire, which is applied by means of flues (so arranged that the heat passes completely round the seggars, giving out an equal heat top and bottom), operates very gradually, lest the goods should split or crack, but little by little it increases until the maximum of heat is reached, from which time it goes steadily forward until the process is completed, which takes altogether from forty to fifty hours. When the ware is sufficiently fired, the ovens are allowed to cool down, as long a time being taken up with the evaporation of the heat as has been consumed in the application of it; so that, one way and another, a period of something like four days is required for the passing of the ware through the "biscuit ovens." It is now removed from the "seggars," and tested as to soundness of ring by having a smart tap administered to it, which, if the ware has passed the firing ordeal with success, causes it to give forth a musical bell-like sound which all good pottery emits. Girls are employed to sort it, and it is now conveyed to the warehouses, ready to be taken away as required for having the finishing touches put upon it.

It may be that the "biscuit" ware has to be printed according to some pattern, right away, "under the glaze," as the term is. If so two processes are necessary. The design has to be put upon suitable paper with a prepared ink, in the first instance, and then transferred to the surface of the ware. In the matter of the original printing on the paper the method adopted is to print from copper plates, using the desired colours. The common vehicle for embodying the colours is a composition of boiled oil and tar, which is, when mixed with the colour, rendered sufficiently liquid by spreading it upon a hot iron plate. The printed transfer is laid upon the ware and rubbed carefully in with a piece of flannel, so that all parts of the design may press equally upon the "biscuit," which, from its porous nature, rapidly absorbs the colour. When this has been done the paper is washed off by plunging the piece into water, and the article is passed on to the hardening kilns, where the oily nature of the transferring medium is destroyed; otherwise the after process of applying the glaze could not be successfully performed. In the kilns the ware is heated to a temperature just sufficient to effect the required purpose. The glaze can now be applied without any risk of failure. This is done by dipping each piece in a vessel containing a solution of glaze suspended in water. This glaze is, as its name indicates, a sort of liquid glass, and during the process of immersion, the water is absorbed by the porous "biscuit" and the glaze is left safely deposited on the surface. The ware has now to be subjected to a further baking if over-glaze work has to be added, otherwise the pottery is finished. For the over-glazing the ware has to be taken to what are called the Glost ovens, where, once more packed in "seggars," it has to undergo a moderate heat, the process in this instance lasting only some fifteen or sixteen hours. The over-glaze ornamentation is for the most part done by women and girls, the mode of operation being very similar to that of ordinary painting on canvas or wood. The colours used, however, are different, being of the kind termed enamel, and are made from metallic oxides. The women do not originate the designs from which they work, but are simply the clever colourists of drawings which have been transferred to the ware. Further ornamentation is done in the gilding shops, and this is the final decorative stage of all. Nothing now remains but for the pieces to be again submitted to the action of firing in a kiln, for about six hours, during which time an ordinary red heat is maintained. The colours are now bright and clear, and after the gold has been burnished, and the rough parts have been made smooth by means of sand-paper, the ware is ready for being transferred to the warehouse, previous to being despatched to customers.

It would be difficult to find a more attractive display of art-pottery than is to be met with in the warehouses of Messrs. Mintons. Those who have seen the exquisite specimens of pottery shown by this firm and others at the various international exhibitions there have been, may form some slight notion of the magnificent collection which is always on view, in spite of the constant changes that are going on; and those who have visited the porcelain works at Sèvres, may have seen something equal to it in point of brilliance. The charm of the collection of finished articles to be seen in the warehouses of the English firm, however, lies not exactly in the beauty and costliness of its single pieces, but in the rich variety of objects presented to the eye The pieces range from the humblest article of earthenware to the most delicately coloured and most costly of dinner-services—from the fragile specimens of toilet ware to immense vases fit for a nobleman's hall. A division of classes is adopted, it is true, but the sub-divisions are so numerous that there seems to be endless variety of colour and form in every room. There is a room wherein nothing but toilet services are shown; another where the space is entirely occupied with dinner services; a third in which white ware is exclusively shown; a fourth which is kept for general goods; a fifth for cream-coloured pieces; and so on through a long series of elegant apartments.

From the warehouses we proceed to the Show Room, a noble apartment whose roof is supported by Corinthian columns, from which branch arches, giving a light and elegant appearance to the room. Here the artistic sense is ministered to in a most striking degree. Effect rather than classification has been studied in the arrangement of the objects here—light, colour, and contrast having all been duly considered. The various articles seem to belong to each other, so admirably have the laws of harmony been observed. It is only when we are confronted with this seemingly endless diversity of specimens that we get an edequate notion of the vastness and variety of the operations carried on by this firm of potters. As we make the tour of the factories and workshops we only see a section at a time, but here we have put before us a combination of results the contemplation of which produces wonder and admiration. What would the founder of the firm, the humble engraver, Thomas Minton, have said could he but have seen into the future which is our present, and have realized the picture of wealth, beauty and elegance which is here set before us? Not even in his most extravagant dreams could he have imagined anything so enchanting. The show of vases alone is worth a journey to Stoke-upon-Trent to see. They are of numerous shapes and sizes, and wonderfully diversified as to ornamental treatment and colour. Some of them are of very massive appearance and stand five feet six inches in height, the longest axis of the oval of the bowls being four feet six inches. These are all of Majolica ware, some of them bearing decorations in imitation of fruit and flowers, others having classical heads upon them with intertwining garlands of vine or laurel leaves. Other highly successful reproductions in Majolica show beautiful combinations of natural effects, some treated conventionally, some from a grotesque point of view, while others are treated realistically. Corals, shells, foliage, birds, animals, fish, are all represented in bold relief, with many adroit turnings and twistings for the sake of artistic effect. The modelling of the various objects of statuary which form so pleasing a feature of this apartment is in almost every instance unexceptionable. There is the well-known "Reading Girl" in glazed earthenware, with the "Skipping Girl" as a companion; there are some marvellously fine reproductions of Graffito vases, which as specimens of the potter's skill are unsurpassable. The impression made also by the splendid samples of the ware to which the name of Henri Deux, or Faïence d'Oiron, has been given, is a lasting one—never, in fact, to be forgotten. This choice ware is for the most part made only in small pieces, but Mintons have quite solved the problem of its manufacture, and in the specimens of the pottery which they now produce obtain results quite equal to the original *Faïence.* This ware has a whitish-yellow glaze and clay, and the pattern is engraved on the clay, while the incision is filled in with clays of other colours. The raised ornaments are also in different colours. The Henri-Deux ware, however, must necessarily remain a rare production, its very great cost precluding the possibility of anything like a general adoption of it. As an evidence of skill and ingenuity, this ware is most remarkable; whether, beautiful as it is, it is worth all the trouble that the potters have been at in producing it is, of course, a matter which can only be decided by the number of persons who are willing to go to the expense of purchasing it. It would be useless to attempt even to enumerate on the catalogue principle a list of the hundreds of other works in art pottery which the show room of Messrs. Minton reveals; suffice it that nearly the whole range of the manufacture is covered by them, and that in the lines which are special to themselves, and which they were the first to introduce, they are deservedly at the head.

We have still a branch of the works of Messrs. Minton to explore before we have completed the round of their extensive establishment, and that is the portion which is devoted to the making of tiles—an industry that the name of this firm has been for many years intimately associated with. The premises in which this business is carried on are situated apart from the other buildings, although some of the processes employed are very similar to those connected with the ordinary ceramic manufacture. The last quarter of a century has seen a remarkable revival in the taste for tiles, a fact which is greatly due to the excellent workmanship and the beauty and originality of the designs which Messrs. Minton and other firms have turned out during that period. Artists of the first eminence have been employed by them in designing pictorial effects, prominent amongst them Mr. H. Stacy Marks, R.A., who drew a series of illustrations descriptive of the "Seven Ages of Man," as well as other attractive subjects, upon which there has been a great run. It was a happy idea to embellish our firesides with reproductions in pottery of high-class works of art, now awaking thoughts of a quaintly humorous nature, and now arousing a whole dreamland of poetical fancies, as the occupant of the easy chair sat and mused before the fire. Such objects of decorative art have added in a sensible degree to the comforts of home, and have been highly appreciated. The tiles manufactured by Messrs. Minton are made of clay reduced to a fine powder, and, when in an almost dry state, submitted to a very heavy pressure. The course adopted is to grind the clay when dry, and then pass it through a machine called a "silter." After being put through this machine and slightly moistened, the clay is collected on a bench attached to the press. When this press is about to be put into operation, a sufficient quantity of the prepared clay is placed in what is technically known as a "semidie." The press then descends, and, by means of an immense pressure, forces the moistened dust into a tile so solid that further contraction is impossible, and the tile is formed into a mass which will bear handling without breaking. The upper part of this tile, which is destined to receive the design, is perfectly smooth and plain, while the under and rougher side has impressed upon it the words, "Mintons' China Works." There are a large number of these presses continually at work, and when it is stated that one of them is capable of turning out as many as 150 dozens of tiles per day, some notion may be gathered of the immense number of these ornamental objects produced by Messrs. Minton from day to day. When the tiles have been pressed, the edges are sand-papered and they are despatched to the "biscuit" oven to be fired, in precisely the same manner as in the case of earthenware. On emerging from the "biscuit" oven the tile is in a fit condition for being decorated. The designs are stereotyped in the first instance, and from the stereotypes the transfers are printed in colour on an ordinary printer's press. The design may be as simple or as complex.as may be desired, for there is practically no limit to the capabilities of this method of ornamentation, and it is quite a common thing for one tile to be printed with four or five different colours. There are stoves attached to the printing presses, and the transfer paper is placed upon the tiles in the usual manner. Some tiles are reserved for special ornamentation by hand, the process being much the same as in ordinary painting. The varieties of the tiles made at these works are exceedingly great, including such as are intended for dados and other mural decoration, such as are required for furniture and cabinet-work, for flower boxes and jardinieres, for fireplaces, grates, mantel-pieces, hearths, and so forth, the tiles being made of extra strength, and the enamelling colours being all under the glaze, rendering the patterns practically indestructible. Mintons do not manufacture the ordinary floor tiles. It would be interesting to describe some of the more favourite designs which celebrated artists have made for the purpose of being reproduced upon the tiles made by Messrs. Minton. We have already referred to Mr. Stacy Marks' clever designs of the "Seven Ages of Man." Equally able, in their way, are the designs of Mr. J. Moyr Smith, tinted in monochrome, illustrating scenes from the Waverley novels, the subjects being well selected and the drawing boldly and effectively made. Then there is a series devoted to scenes from Shakspeare's plays: and another series of twelve tiles, the subjects for which have been taken from elfinland. Another artist has gone to the Scriptures for his scenes, and has produced a very effective set, which will no doubt find their way to many a country parsonage or schoolroom, where the lessons they are meant to enforce will be duly esteemed. "Æsop's Fables" furnish another capital list of subjects, Mr. Moyr Smith being again to the fore with his pencil. Fairy tales, subjects from English history, industrial scenes, farm and field incidents, rustic comicalities, and illustrations of bird life are also amongst the matters treated by Messrs. Minton's artists. Leaving the purely pictorial tiles and coming to those which are more strictly decorative, we find many very beautiful specimens, rich in colour and exquisite in "design." Some are of the geometrical type, enriched with splendid colours; some carry out a pretty floral pattern, along with a more conventional surrounding or interlacing; some are filled with delicate tracery, relieved by effective contrasts of colour; some are Oriental in character, with patterns of elaborate richness; and some, again, are decorated in simple white and gold. The variety is without limit. It is as enjoyable as going to a high-class picture exhibition to pay a visit to the tile works of Messrs Minton, in which from beginning to end nothing is seen which does not possess an artistic bearing.

Another distinct department of Messrs. Minton's establishment is the China works, where, to a certain point, the operations performed are similar to those pertaining to the making of earthenware. After the clay has passed the Slip

House, and comes from the presses, it undergoes a process called "wedging," which is accomplished in the following manner:—A portion of the clay is placed on a plaster slab, where it is pounded with a mallet, then cut into strips by means of a wire, and again beaten well together, the object being to drive out, as far as possible, any fixed air which may be contained in its substance. For the making of china, the process of throwing differs slightly from that adopted in the earthenware manufacture, inasmuch as only what is known as the lining is first made by the thrower. After having produced a sufficient number of linings, the thrower charges the head of his wheel with a press into which the mould fits. The linings are then placed in the mould and pressed into it, thus forming the outside ornamentation or pattern, the inside being formed with a kind of templet. Cups are afterwards blocked on a plaster block in order to solidify the bottom. The clay, while yet unfired, has a peculiar colour, which is owing to the quantity of calcined bones which it contains, and which are not used in the earthenware manufacture. The china ware is dried upon blocks in steam drying rooms, and thence is passed to the turning shops, and receives its finishing touches much in the same way as earthenware. Before leaving this branch of the business it is necessary to allude to the plate-making shop, which forms one of a series of rooms adjoining the turning shops, and is fitted with all necessary stoves. Six shops are employed in the making of pressed goods, but the process is the same to a great extent as we have previously seen. Here, too, the china is finished ready for the "biscuit" ovens. There are also handling rooms like those in the earthenware department. In the pressing rooms we notice certain pieces in which the embossment given by the mould is undercut by means of a sharp tool. This process is a somewhat risky one, the material operated upon being so thin and so "short" in its nature that it is exceedingly difficult to manipulate without breaking it, and even if this operation is performed with success there are still the risks of drying and firing to run, which are no less serious. The master assumes the latter risks, however, but the workman has to be responsible for any mishaps during the process of undercutting.

We have already mentioned the name of M.

Arnoux in connection with the artistic department of this great establishment, but there is another gentleman who has by his artistic ability done much to secure for Mintons a special eminence in regard to their artistic pottery. That gentleman is M. Solon, a French artist, who was formerly employed at the famous china manufactory at Sèvres, but came over to this country in 1870, in response to an offer made to him by Messrs. Minton. He was the means of introducing that particular style of ornamentation known as *pâte-sur-pâte*, a process in which advantage is taken of the transparency of the Parian body with which the figures are painted, to give very delicate and beautiful effects of light and shade. The clay is laid on by means of a brush, and then worked with suitable tools, the thick parts of the clay for lights, and the thin and transparent portions for shades. The effects produced are cameo-like and very beautiful. In this attractive style of ornamentation, which may be more correctly described as modelling rather than painting, the artist has to be his own designer, and has to carry out his own design, the effect of which greatly depends upon his delicacy of touch and skill in manipulation. The clay is not, it should be explained, laid upon the coloured ground all at once, but layer by layer—as the title *pâte-sur-pâte* itself indicates—and, as a result, the beautiful cameo-like appearance is obtained. When the process is completed the article is "biscuit" fired, as in the case of ordinary and less precious goods. A peculiarity of the process is that the body of the clay can be of any colour, and this allows of a great variety of effects being attainable. M. Solon deserves every credit for the chaste and beautiful specimens of art pottery which he has been the means of introducing, and credit is also due to the very able staff of assistants —all necessarily artists—who work under his instruction and superintendence.

M. Arnoux, the art director of the concern, has been with Mintons since 1848, and in his own special department has rendered most valuable service to the firm. He has the entire artistic control both as regards hand-painting and the other branches of pottery decoration. It is highly interesting to watch the numerous artists at work in the various studios set apart for them. At first sight, the paintings do not appear very attractive, the colours being dull, and the drawings "curious," but all that is required to bring out their full artistic effects is the application of the heat of the furnace, which animates the dull colours into brightness and beauty, and developes the apparently unfinished drawing into a charming flower, an attractive landscape, or an engaging group of figures. It is sometimes necessary to subject these designs to repeated firings in the kilns before the desired result is gained.

There are many other workshops than those we have described in this great industrial hive, which has been gradually built up on the foundations laid by Thomas Minton in 1793. We have probably said sufficient, however, to show in a general way the extent and importance of the operations carried on by this firm. Many "fortunes" have been made out of the business, and the men who have made them have well deserved them, for they have earned them by their skill and industry, their patience and energy. Many more "fortunes" will doubtless still be won in the same way, and on the same ground; the old spirit of determination evinced by the early Mintons continuing to animate the present members of the firm and spur them on to constantly increasing effort. When a concern has once been started on firm, well-defined lines, and with strong earnestness of purpose, it is, indeed, more than probable that it will expand and prosper, for the traditions of a good business course have been laid down, and are not easily broken away from. The works of the firm cover an area of seven acres, and give employment to nearly 2,000 persons.

SIR WM. G. ARMSTRONG, MITCHELL & CO.

SIR WM. G. ARMSTRONG, MITCHELL & CO.

IN the Naval Architecture department of the Inventions Exhibition, of 1885, at South Kensington, the art of maritime warfare, as that art is now understood, received its fullest illustration in the series of models of ships of war which the firm of Sir William G. Armstrong, Mitchell and Co. there exhibited. These models represented a great variety of vessels, from the Chilian cruiser "Esmeralda," of 3,000 tons displacement and a speed of over eighteen knots, to the Nile steamer "Safia," of 150 tons displacement and ten knots speed, which was the last steamer abandoned by Sir Charles Wilson at Gubat, after his unsuccessful mission to Khartoum. There was a set of half models of gunboats showing the gradual development of boats of the "Staunch" class, beginning with the "Staunch" herself, built in 1867, and ending with the Chinese gunboats, "Iota," "Kappa," and

"Lambda," built in 1881, worked and loaded by hydraulic power, two 12-pounder breech-loading guns, and two Gatlings. The firm had twenty-seven exhibits in all, which comprised models of war-ships, built for Holland, Japan, Russia and Austria, as well as steamers for the merchant service, amongst which were vessels of 9,000 tons displacement, one of them, the "Silvertown," having been launched in the extraordinarily short space of a hundred working days from the time her keel was laid, being entirely finished in seven months from the date of the order. Visitors learned in such matters found in these numerous models many striking improvements, the invention of recent years, in details of construction, indicating, when taken together, a great advance upon the achievements of former times in this direction. The same firm also exhibited in the Fire-arms group, a collection of models and drawings illustrating modes of mounting heavy guns. Sir William Armstrong's name was further represented in connection with the Inventions Exhibition by a descriptive essay on hydraulic machinery, specially written by him for the official catalogue.

It would have been strange indeed if an exhibition expressly projected for the purpose of showing what progress had been made in all departments of invention during the previous quarter of a century should not have given prominence to the name of Sir William Armstrong, whose successful career as an inventor covers far more than the period represented by the exhibition—from 1862 to 1885. To trace that career, from its humble beginning to the date of our writing, when, full of years and honours, Sir William stands at the head of a firm whose works reveal a frontage to the river Tyne of over a mile, and whose operations in the making of ships and implements of war are only second in importance to those carried on by the Government at Woolwich and elsewhere, cannot fail to be an interesting task.

In the days of the moss-troopers, the name of Armstrong—a more euphonious rendering of the older appellation of Strong-i'-th'-arm—was a name to conjure with in the borderland of the North, when might was right and the man who could lead his neighbours to victory over their common foemen beyond the Tweed was looked up to as a chieftain. It took brain as well as muscle, however, to make leaders, and from the prominence which the name of Armstrong obtained in those far-back times, it is only fair to conclude that they must have been men of sterling quality all round. From what particular branch of these Armstrongs the present Sir William Armstrong is descended could probably be shown, if it were considered worth while, but when a man possesses in himself a greater distinction than all his ancestors put together, the mere question of genealogy becomes of small moment. It may sometimes be of importance to a few rather quiet-going people in everyday life to show to the world that if they have done nothing themselves to win renown of any kind, that they at least had ancestors who made their mark, for good or evil, upon the centuries gone by; but with one who by his own ability and industry builds up a fame for himself amongst men there can be no greater pride than the consciousness of his own achievements. It will be sufficient, therefore, for the purposes of our brief biography, to go no further back for our starting point than to Sir William's father, a Cumberland man who began life at Wreay, a small place near Carlisle, with no brilliant prospects, but with a good heart and a clear head, and a determination not to be content with small things. He was induced to migrate to Newcastle at the suggestion of Mr. William Losh, a partner in the firm of Losh, Lubbrin and Co., corn merchants, and entered the office of that firm as a clerk at a very modest salary. How well he acquitted himself of the duties entrusted to him, and how thoroughly he obtained the confidence of his employers, may be gathered from the fact that in course of time he was made a partner, and ultimately, on the retirement of the senior members of the firm, succeeded to the entire business, which he managed with considerable success thenceforward to the time of his death. He took a lively interest in the affairs of the town and in all leading public questions, and for many years was a prominent member of the Newcastle Town Council, being elected alderman in 1847, and in 1850 filling the office of mayor. He was one of the founders of the Newcastle Literary and Philosophical Society, and had a special liking for mathematical studies, in which he had not much difficulty in interesting his son William, when the lad, who had a natural bent in that direction, came to years of under-standing. William Armstrong was born in Newcastle in 1810, his mother being the eldest daughter of Mr. William Potter, of Walbottle Hall. The father lived until the year 1857—long enough to see his son famous among men as an inventor and raised to knightly dignity.

From the days of his childhood, Sir William displayed the possession of inventive genius, and even in the matter of his toys indulged in mechanical arrangements of his own devising which were far in advance of his years. He was a delicate boy, and in order to protect him from the rigours of the Northern climate, his parents used to keep him confined to the house for months together during the winter, when he took advantage of his enforced seclusion to exercise his ingenuity upon such unpromising materials as happened to be at hand. When only five or six years old he was accustomed to amuse himself with setting a number of old spinning wheels in motion by means of weights descending on strings from top to bottom of his father's house over the staircase railings, making the wheels perform evolutions in imitation of pumping water and grinding corn. The days passed pleasantly enough to him while superintending these diverting operations, and so long as his mechanical playthings served to make his confinement acceptable to him, his parents looked on with gratification, without, however, for a moment suspecting that in these early evidences of ingenuity there was foreshadowed the strong genius of the inventor. Friends and relatives bought mechanical toys for the little prisoner, though they could not bring themselves to regard with unmixed satisfaction his mania for pulling them to pieces. With him this was a matter of simple investigation not to be resisted; to them it looked much more like pure mischief. When the cold winds had gone, and the atmosphere was tempered with sunshine, he was allowed to leave the house, and would often pay a visit to the establishment of his maternal grandfather, who was a builder; and in the joiners' shop there, where "old John Fordy" was the presiding genius, young Armstrong would spend hour after hour in working out his mechanical notions, with wonderful patience and industry; for though as yet his vision had not extended beyond the realm of toy-land, he showed the true spirit of invention in all that he undertook, and improved upon most of the toys that were presented to him. Sometimes he would pretend to assist "old John" in the regular work of joinering, and, happy in the thought that he was rendering useful service, would look up into the face of the old workman, and ask, with an earnest gravity that there was no mistaking, "How much money do you think I could earn, John?" The kindly joiner had to confess this to be a question beyond the power of his answering, but as he scanned the pale face and transparent hands of the little workman, and called him his "canny bairn," he would smilingly encourage him to further efforts, much as he desponded regarding the lad's health.

After receiving some educational training at private schools in Newcastle, William Armstrong was sent, in 1826, to the Bishop Auckland Grammar School, and continued there a few years for the completion of his scholastic studies. By this time his health was established, and he was able to cultivate his talent for mechanics with greater freedom than during the period of his previous home life. A visit to the engineering works of Mr. Ramshaw about this time made a deep impression upon the mind of the Bishop Auckland student, and so much was Mr. Ramshaw pleased with his visitor and the interest evinced by him in the various processes that were going forward that an invitation to the engineer's house speedily followed. That invitation was a fortunate event for young Armstrong in more senses than one, for it was at Mr. Ramshaw's house that he met Miss Ramshaw, the lady who afterwards became his wife, and who has since shared his anxieties and his triumphs, and been to him a true "help-meet." In spite of the many indications of scientific bias and inventive yearnings, which proclaimed themselves in William Armstrong in his youth and early manhood, the strange perversity of fate which seems to dog the footsteps of inventors in their beginnings followed the corn merchant's son, and diverted him from the path that, it ought to have been seen, was the one that he should have pursued from the first. William Armstrong's father could see nothing extraordinary in his son's mechanical sympathies and gifts; to him they were the mere amusements of an idle hour for one who, like his son, had the chances of winning his way in one of the learned professions. The father intended William for the law, and, doubtless with many misgivings as to the advisability of the step, the future artillery-engineer entered the office of Mr. Amorer Donkin, a Newcastle solicitor of standing, and the friend and adviser of the family, as an articled clerk. This was done immediately after his return from the Grammar School at Bishop Auckland. All thoughts of becoming an engineer were now cast aside, and young Armstrong devoted himself with intelligence and diligence to the study of the law, finishing the latter portion of the term of his apprenticeship in the London office of his brother-in-law, Mr. W. H. Watson, who was then a special pleader in the Temple, but was afterwards raised to the judicial bench as Baron Watson. After his admission as an attorney, Mr. Armstrong returned to his native town, and a partnership was arranged for him with the firm to whom he had been articled, which firm practised from that date under the style of Donkin, Stable, and Armstrong.

It was now considered that William Armstrong was settled for life in the highly honourable profession of the law. For thirteen long years the junior partner stuck to the work of advising clients, directing legal processes, making deeds and wills, and studying titles. The business was an extensive one, and prosperous, and it seemed as if it would have to be "William Armstrong, solicitor," to the end of the chapter. But the young lawyer was blessed with a certain amount of leisure-time, which he employed for the most part in following the pursuits which had been so great an attraction to him as a boy, although as yet he did not permit his taste for natural science to carry him beyond the bounds of his amusements. He was an ardent disciple of Izaak Walton, and was often to be found with his rod and line by the edge of the favourite fishing streams of the North. He did not fish as other anglers did, however, but was for ever inventing improvements in his tackle and equipment, becoming one of the most accomplished fishers of the neighbourhood. Amongst other things, he invented a new bait-basket whereby his minnows were kept at a proper temperature. If it had not been for this pastime of fishing, indeed, his better genius might never have been called forth. It was during a temporary sojourn in the pleasant dale of Dent, in the Craven district of Yorkshire, where he had gone in search of trout, that the Newcastle solicitor chanced upon a discovery which changed him from an inventive trifler to a practical worker out of scientific problems. This was in the summer of 1836. While plying his line near to a rustic mill, his attention was attracted to the water-wheel, fed by a rill above, which descended from a great height. He observed that twenty feet only, of several hundred feet descent, was utilized; the rest being unproductive. The possibility of using the stream as a more effective motive power now took firm possession of his mind. Of all the thousands who had seen that stream before, not one had noticed in it the thing which to William Armstrong was a revelation and a discovery. The idea came like a flash of light, as all great discoveries do. The realization may be a question of time and labour, but the idea-germ is the fruit of an instant. Galileo saw the measure of time in the swinging of the church lamp; Newton discovered the law of gravitation by the falling of an apple; Heilmann discerned the principle of the combing-machine while watching his daughters combing out their hair.

When Mr. Armstrong returned to Newcastle from his fishing expedition in Dent Dale, he must have felt a strong dislike to those familiar personifications of the legal fiction of those days, Messrs. John Doe and Richard Doe, against which imaginary personages the whole of the legal talent of the country was supposed to be engaged in deadly battle. John Doe and Richard Doe, however, were destined to be his companions for many a long day yet, though they were never more to be his affectionate bosom friends. Loyalty to his partners attached him to his business, but away from that, his leisure moments were dedicated to the study of constructive mechanics, and, in particular, to the working out of the new idea in hydraulics which had been suggested to him by the Yorkshire waterfall. He was convinced that if the stream were conveyed from its summit in a pipe, and caused to act by pressure at the base, the whole fall, instead of a fractional part of it, would become utilized as a motive power, and he set himself to the full solving of the problem by commencing a series of experiments at Watson's High Bridge Works, which were continued month after month, and year after year, with undeviating persistence. Mr. Armstrong spent much time at Watson's foundry, superintending the elaboration of his own models; and the assistance he received from young Mr. Watson, now the senior partner in the firm, and from the Hutchinsons, father and son, then engaged at the High Bridge Works, was of great value to him. The spirit of enthusiasm was strong in all of them, and they had faith in the ultimate success of the scheme which they were so zealously endeavouring to bring to perfection. An automatic hydraulic wheel, acted upon by discs made to enter a curved tube at the radius of the wheel edge, was the first result of the lawyer-inventor's experiments, and this initial attempt to convert a column of water into a motive power was practically tested at the Skinners' Burn, adjoining the brewery of Alderman Potter. The inventor's expectations were not altogether realized on this occasion, but a valuable lesson was taught, and the science of hydrostatics was sensibly advanced by the experiment.

About this time another discovery diverted Mr. Armstrong's attention for a while from the study of hydraulics, and took the lawyer a step further away from his profession. At the Cramlington Colliery a curious phenomenon had been observed in connection with the working of the engine belonging to the pit. Something " uncanny like " was noticed at the engine boiler by the workmen. When they came to regulate the safety valve while steam was blowing off, fire was seen to come out at their finger-ends, they said. What could it be? It was a mystery that scientific men throughout the country interested themselves in, and the more they investigated, the more were they puzzled. By-and-bye, it was discovered that the "uncanny" phenomenon had some connection with electricity. The boiler was found to be insulated upon a dry seating, and the friction produced by the escape of particles of water, blowing away with high pressure steam, produced electricity, and a nervous shock was experienced when the hand was held in proximity to the escaping steam. Mr. Armstrong saw the electric manifestation, and although many men of eminence in the scientific world made it the subject of investigation, and experiments bearing upon the generation of electricity by high-pressure steam were started in all directions, none made the headway that the Newcastle solicitor did in bringing the matter to a practical result. He detected the laws which regulated the phenomenon, and, with consummate tact and skill, reduced them to subjection by the means of a machine which came to be known as the "hydro-electric" machine, and attracted great attention both in this country and on the Continent. The machine was made, from the inventor's models, at the works of Messrs. Watson and Lambert, and specimens were supplied to Professor Faraday and to the leading scientific institutions of Europe and America. Mr. Armstrong was elected a Fellow of the Royal Society, and from that time forward was recognized as one of the leaders of the world of science. In 1844 he delivered three lectures at the Newcastle Mechanics' Institute, in which he explained the theory of hydro-electricity in detail, the lectures being illustrated by elaborate apparatus, and the connection between electricity and steam being fully shown. At the meeting of the British Association the previous year, held at Cork, Mr. Armstrong had read a paper in which he had recapitulated all that had been done in the very interesting inquiry upon which he had been engaged.

After he had completed his hydro-electric machine, Mr. Armstrong once more resumed his favourite study of hydraulics, and continued to make experiments towards the perfecting of the mechanical contrivances, upon which he had previously expended so much study. As yet his inventions had not resulted in financial gain to him; but, undaunted by this, he stuck to his hobby, never for a moment doubting the ultimate success of his labours. So matters stood in 1845, when a circumstance occurred which materially helped his scientific progress. This time he had to acknowledge his indebtedness to his legal connection for an important step upward in his career of invention. The firm of Donkin, Stable, and Armstrong were appointed solicitors to a company that had been organized with the object of procuring a supply of water from Whittle Dene for the towns of Newcastle and Gateshead. The sanction of Parliament was obtained to the scheme, but not until a formidable opposition had been argued out of court. It was found when the construction of the works was commenced, that the company's junior solicitor was able to advise them on many more important matters than their legal duties and liabilities. His knowledge of hydraulics was placed at their service, and, fortunately for him and them, and the world generally, they showed a disposition to avail themselves of it to the fullest extent. A suitable opportunity at last presented itself of applying to practical purposes the idea which the little Yorkshire streamlet had years before first engendered in his mind. He had some time before exhibited to the Newcastle Literary and Philosophical Society the model of an hydraulic crane, which had attracted some attention, and he now had a crane constructed from this model and erected at Quayside, the pressure in the water-pipes of the Whittle Dene Company being employed as the motive power. The experiment was completely successful, the crane being used with astonishing effect in the loading and unloading of ships. News of the invention spread through the country; leading engineers from all parts came to see the crane in operation, and the upshot was that before long orders were received thick and fast for the new hydraulic machine.

Mr. Armstrong now confessed to himself that he had reached the turning point of his life, and that it was as an inventor, not as a lawyer, that he would have to finish his career. He was in his thirty-seventh year, and full of health, hope and energy. Why should he any longer continue harnessed to a profession for which he had ceased to feel liking or sympathy? Mr. Rendel, the eminent engineer, became his firm friend at this period, and strongly advised him to adopt the career for which nature had intended him—that of a mechanical engineer. Mr. Armstrong was elected a member of the Institute of Engineers when the success of his hydraulic crane was established, and all things tended towards the favouring of the wishes of his heart—the abandonment of the humdrum of the law for the more congenial pursuits of mechanical science. He made the leap, and in no very long time found that he was on the road to fortune.

In 1847 an engineering partnership was formed, with Mr. Armstrong at its head, and works were started on a small scale at Elswick, for the manufacture of hydraulic cranes. Mr. Armstrong's old friend and partner, Mr. Donkin, was associated with him in the venture, as were also Mr. Potter, Mr. Richard Lambert, and Mr. Cruddas. For two or three years the new firm had a hard struggle, but little by little they succeeded in establishing themselves on a firm footing, and thenceforward experienced a steady increase of prosperity.

The new crane met with strong opposition on the part of some who afterwards profited largely by its adoption. Mr. Jesse Hartley, of Liverpool, for a long time declined to acknowledge the merits of Mr. Armstrong's invention, and as he was a man of weight and influence in the engineering world, his obstinacy had an injurious effect. How he was eventually brought to change his opinion has been related by the inventor himself, who says:—"Amongst others, the late Sir William Cubitt (then Mr. Cubitt) took a very early interest in the machine, and wrote to Mr. Jesse Hartley, who was then the engineer of the Liverpool Docks, urging him to go and see it; but that somewhat eccentric gentleman, who was very averse to novelties, at first flatly refused to do so. A second letter from Sir William Cubitt put the matter in such a light, that Mr. Hartley could not persist in his refusal without incurring the imputation of shutting his eyes to improvements; so, without giving any notice of his intention, he went to Newcastle alone to see the crane. It was not at work when he arrived, but the man in charge was there, and Mr. Hartley entered into a bantering conversation with him. This man, who went by the name of 'Hydraulic Jack,' had acquired great dexterity in the management of the machine, and being put upon his 'mettle' by Mr. Hartley's incredulous observations, he proceeded to show its action by a daring treatment of a hogshead of sugar. He began by running it up with great velocity to the head of the jib, and then letting it as rapidly descend, but, by gradually reducing its speed as it neared the ground, he stopped it softly before it quite touched the pavement. He next swung it round to the opposite side of the circle, continuing to lift and lower it with great rapidity while the jib was in motion, and, in short, he exhibited the machine to such advantage, that Mr. Hartley's prejudices were vanquished. Mr. Hartley, who will be remembered as a man whose odd ways were combined with a frank and generous disposition, displayed no feeling of discomfiture, but at once called upon the author, whom he laconically addressed in the following words:—'I am Jesse Hartley, of Liverpool, and I have seen your crane. It is the very thing that I want, and I shall recommend its adoption at the Albert Dock.' With scarcely another word he bade adieu, and returned to Liverpool. This anecdote marks an epoch in the history of hydraulic cranes, which then passed from the stage of experiment to that of assured adoption."

All apprehension of failure was soon removed from the mind of the inventor. The hydraulic crane was supplied to the Liverpool Docks, and was gradually introduced into all the great ports of the world. But, as time went on, the principle of the hydraulic crane was greatly extended by Mr. Armstrong. As first applied, a natural head, gained by altitude, was necessary, to put the hydraulic machine in motion, so that power could only be employed in positions situated below the point where water was accumulated. To obviate this, the inventor substituted an artificial head, or accumulator, for the natural head obtained by altitude, and so rendered the new motive power available in all situations. A natural supply of water from a height has sometimes furnished the power, at others a river-wheel has been made to produce the required pressure; but the most general practice has been to employ a steam engine to pump water under a great pressure into an accumulator. From this accumulator the water has been conveyed by pipes often to great distances, and distributed wherever wanted. Thus, the length of pressure pipe in many of our large commercial docks amounts to several miles, and, wonderful as it may seem, hundreds of hydraulic machines are connected with it, all supplied by a single steam engine, which, pumping water into the accumulator, suffers no disturbance from the fitful manner in which the water is drawn off from the pipes. This principle has been applied to a remarkable variety of purposes, and, as Sir William Armstrong has shown in his introductory essay on hydraulics, written for the Inventions Exhibition, is now utilized for the "the working of lock-gates, sluices, capstans, movable bridges, and other machinery used in dock operations, and to the loading and discharging of ships at coal ports, as well as to various purposes connected with railway stations." The inventions of recent years in this department of mechanical science are chiefly a development of the principle which Sir William Armstrong learned from the little mountain streamlet. Hydraulic pressure machinery is now largely applied to various workshop operations, including forging by hydraulic pressure instead of hammers. Hydraulic machinery is also used for the purpose of controlling the recoil, and effecting the various movements involved in the working of ordnance, especially where the weight and magnitude of the guns and their fittings are too great for the employment of manual labour. One of the latest developments of the utilization of power transmitted by water is instanced in connection with the construction of the Alexandra Docks now in progress at Hull. There, we are told by the originator of hydraulic machinery, "hydraulic power is ultimately to be applied for the usual purposes in mercantile docks; the steam-power and accumulators have been erected as a first step in the construction of the docks, in order that the power might be applied to the excavation of the dock, the driving of piles, and the lifting of materials for the building and backing of the walls. Many of the machines used for this purpose are the ordinary cranes, jiggers, and capstans, which will be used on the completion of the dock for the usual trade purposes, while others have been specially designed for the operation of construction." In all this development of hydraulic power the firm at Elswick have, as might be expected, taken a chief part, and, notwithstanding the many later inventions of a different character with which the name of the founder has been associated, the construction of hydraulic machinery still remains a principal feature of their vast establishment.

We must now return to the early years of Sir William Armstrong's experience as the managing partner of the engineering works at Elswick. For a few years the firm had no thought of extending their operations beyond the making of hydraulic machinery, and, the demand for their cranes being large, they were kept successfully employed in this branch of business. So things continued, until an incident in the Crimean war directed the mind of Mr. Armstrong to the "murderous business of war." The battle of Inkermann was fought on the 5th of November, 1854. After the British troops had stood for some hours the brunt of the Russian attack, the French came to their assistance; but the battle was turned against the Russians chiefly by the fire of a couple of 18-pounder guns, which, at a late hour, and by great exertion, were brought to play upon the Russian ranks. Victory on our side was said to be owing to the superior range of these two guns. When Mr. Armstrong heard of the difficulty which had been experienced in bringing these heavy guns into action, he began to consider whether equal range might not be attained with lighter ordnance. The plan of rifling small arms had been eminently successful. Why should it not be equally so with cannon? Besides, if wrought instead of cast iron were employed in the manufacture of ordnance, a great saving of weight would be effected. We are told by a writer in the *Newcastle Chronicle*, who made special reference to this particular period in our inventor's career, in an article published on the occasion of the visit of the British Association to Newcastle in 1863, that Mr. Armstrong at once set about preparing the design of a light wrought iron gun; and then, with the help of his friend, Mr. Rendel, he obtained access to the Minister of War, then the Duke of Newcastle, and submitted to him his views. He proposed the enlargement of the rifle musket to the standard of a field gun, and the substitution of elongated projectiles of lead instead of balls of cast iron. The minister authorized him to proceed with the construction of one gun. The gun was commenced in December, 1854, and finished in the following April, though it was not submitted to the Government until the beginning of 1856. The reason for this delay was the inventor's great anxiety to make the gun as perfect as possible. A series of experiments, extending not only over the year previous to the submission of the gun to the authorities, during which the Government and the public alike were ignorant of what was going on, but over two years beyond that, was conducted with great patience and perseverance by the ingenious inventor. These experiments, on which so much depended, were carried on in wild and lonely places, and at untimely hours. Sometimes the guns were carried to the moors at Allenhead, 2,000 feet above the level of the sea, where Mr. Armstrong fired away at all hours of the day and night, in all weathers and seasons, much to the alarm of the inhabitants of the quiet country districts, who often imagined that the French had effected an invasion, and were marching through the wilds of Durham intent upon taking Newcastle. In the summer, however, the guns were carried to the coast, and were there experimented on between three and six in the morning. Early in 1856, the inventor, to some extent satisfied with his labours, submitted the gun to the War Office. It was a little 3-pounder, the production of which had cost a thousand pounds and three years of constant effort. At first, the authorities did not regard the new gun with much favour, and called it a "pop-gun." The inventor then bored the gun for a 5-pound projectile, and submitted it again to the Government, who this time agreed to adopt it. It was experimented upon, with the result that Mr. Armstrong was entrusted with the order to make an 18-pounder on the same principle. When that was completed it was submitted to a course of searching and incessant trial by the Rifle Cannon Committee appointed by Government in 1857. In the report of the Committee, issued in 1858, the following reference was made to the new gun :—" Mr. Armstrong proposed a method of constructing a gun which rendered it capable of enduring the strain to which rifle ordnance is submitted. This method was certainly at that time the only one capable of fulfilling that condition; and your Committee have had no practical evidence before them that even at this moment any other method of constructing rifled ordnance exists which can be compared with that of Mr. Armstrong. In combination with his system of constructing or manufacturing a gun, Mr. Armstrong had introduced to the notice of the Government a plan of breech-loading, the gun being rifled on the old polygroove system, which involved the coating of the projectile with soft metal. The combination of construction, breech-loading, rifling, and coating the projectiles with soft metal, came to be termed the Armstrong system. The range and precision of the gun were so vastly superior to all field ordnance known at the time, that, after careful and repeated trials, the Committee appointed to investigate the question, recommend its adoption as the field-gun of the service."

General Peel, speaking in the house of Commons of the capabilities of the Armstrong gun, said that "its accuracy at three thousand yards was as seven to one compared with that of the common gun at one thousand; whilst at one thousand yards it would hit an object every time which was struck by the common gun only once in fifty-seven times; so that at equal distances the Armstrong gun was *fifty-seven* times as accurate as our ordinary artillery." It was said by an Edinburgh Reviewer that "the Armstrong gun could hit a target two feet six inches in diameter, while the (old) service gun could not be relied upon to hit a haystack."

The Armstrong gun and its inventor became the sensation of the day; their fame extended to all the ends of the world; and the English Government were prepared to give Mr. Armstrong the due reward of his energy and genius. It was for him to name his terms. With a patriotism, however, which will always be remembered to his credit, and a generosity the most unbounded, he declined to accept any pecuniary recompense for his labours, and assigned to the Government all his interest in his invention. He made a free gift of it to the nation. But the Government could not afford to allow him to retire to Elswick to resume his former labours; his superintendence was necessary in the manufacture of the guns he had invented, so he was offered and accepted the position of Engineer of Rifled Ordnance at a salary of £2,000 a year, had the dignity of knighthood conferred upon him, and was made a Companion of the Bath. It was the wish of the Government that the manufacture of the new guns should be proceeded with without delay, and that the utmost secrecy should be observed in regard to their construction. It was found that at the arsenal at Woolwich they were not prepared to take up the new gun, their machinery not being of a suitable character for its construction. A contract was entered into, therefore, by the Government with Sir William Armstrong's firm at Elswick, by which it was provided that the company should find the works and plant at its own expense for the sole use of the Government, and that the Government should employ the plant, or, in default, pay such compensation as should, in case of difference, be fixed by the Attorney-General. The contract was kept in force until the month of April, 1863, when it was terminated, and a sum of £65,000 was paid to the company as compensation. Up to the same period, or nearly, Sir William retained the office of Engineer of Rifled Ordnance, as well as that of superintendent of the Royal Gun Factory for Rifled Ordnance, which latter post he had held from November, 1859.

Sir William Armstrong has been styled the pioneer in the new science of gunnery, and in making his invention a free gift to the country he set an example which cannot be too often quoted. Referring to this noble act, General Peel, as Minister of War, said in the House of Commons: "Great as had been the ingenuity and talent displayed by Sir William Armstrong in regard to this invention, they were exceeded by the liberality with which he at once presented to the Government the patent, for which they must have paid almost any sum of money which he liked to demand. He (General Peel) was convinced that the House would be of opinion that nothing could be more liberal than the manner in which Sir William Armstrong had dealt with the Government, and would think that he well deserved the honour which, by her own special and personal desire, had been conferred upon him by her Majesty."

From that time to the present the Ordnance works have formed a chief part of the Elswick establishment, which has grown year by year in all departments until now it constitutes one of the largest, if not the largest, engineering concern in the world. Herr Krupp's famous works at Essen are perhaps the only works that can be compared in importance with those on the shores of the Tyne. Since 1857, the Ordnance department at Elswick has been engaged almost continuously, day and night, in the production of guns and projectiles of ever-increasing power. Up to 1863, Sir William Armstrong was the conscientious, zealous servant of the Government; since then his firm may be almost considered to have been the Government's rivals in the construction of cannon. Ordnance of such gigantic calibre that the ships which scattered the Spanish Armada three centuries ago would scarce contain them, have been made at Elswick, and the struggle for supremacy between the builders of ships and the builders of guns—the one striving to construct impenetrable vessels and the other irresistible artillery—still continues, the Elswick company in more recent years having been amongst the foremost workers in both departments. In a recent lecture delivered by Captain Noble, upon whom the active direction of the Ordnance department at Elswick has latterly devolved, it was stated that "twenty-five years ago our most powerful piece of artillery was a 68-pounder, throwing its projectile with a velocity of 1,570 feet per second; now the weight of our guns is increased from five tons to 100, the projectile from 68lbs. to 2,400lbs., the velocity from 1,600 feet to 2,200 feet, the energies from 1,100 foot-tons to over 56,000 foot-tons." At the present time the Elswick Company are engaged in the construction of three 110-ton guns, each of which will be in one piece, although forty-two feet in length, and having a diameter of twenty-four inches. Each gun will weigh, with its carriage and mountings, 300 tons. It will hold a powder charge of 900lbs. and carry a shell weighing 2,000lbs. with a velocity of 2,000 feet per second, the stored-up energy being equal to 56,500 foot-tons. The Elswick Company have never rested in their efforts; the supremacy which the first Armstrong gun gave them has been all along maintained, and to-day their position as producers of guns and ships of war is unquestionably the first in England, if not in Europe. Other inventors besides Sir William Armstrong have won fame and success in connection with guns on improved principles, and the "battle of the guns" has been fought over and over again in print, but it is not too much to say, that while Sir William Armstrong has never been reluctant to acknowledge the merits of the inventions of others in the science of gunnery, he has at the same time kept his own firm's operations abreast with the movement of the age, the best testimony to which is the unequalled success which has attended the Company's enterprise.

Returning once more to the record of Sir William Armstrong's personal career, mention should be made of his having, in the year 1863, filled the office of president of the British Association when that body met at Newcastle. It was about this time that the subject of our coal supply began to attract attention, and he dealt with the matter with so much ability in his presidential address, showing its great importance to the national welfare, that, shortly afterwards, a Coal Commission was appointed, which resulted in a mass of valuable evidence being obtained as to our coal prospects. He predicted—his prediction being based on elaborate calculations, all of which were duly set forth— that about two hundred years would suffice to exhaust the principal seams of coal in this country. "It is clear," he said, "that long before complete exhaustion takes place, England will have ceased to be a coal-producing country on an extensive scale. Other nations, and especially the United States of America, which possess coal-fields thirty-seven times more extensive than ours, will then be working more accessible beds at a smaller cost, and will be able to displace English coal from every market. The question is, not how long our coal will endure before absolute exhaustion is effected, but how long will those particular coal-seams last which yield coal of a quality and at a price to enable this country to maintain her present supremacy in manufacturing industry." He went on to say that if the production should continue to increase, as it was then doing, the duration of the chief English coal-seams would not reach half the period named. This was regarded by many as the view of an alarmist, and it was said that before coal was exhausted some other motive agent would be discovered to take its place, electricity being generally cited as the coming power. With the knowledge of what has taken place in this direction during the twenty three years that have elapsed since Sir William Armstrong delivered his address, it will be interesting to refer to what Sir William said on that subject as an indication of the correctness of his judgment in scientific matters. "Electricity, like heat," he said, "may be converted into motion, and both theory and practice have demonstrated that its mechanical application does not involve so much waste of power as takes place in a steam-engine; but whether we use heat or electricity as motive power, we must equally depend upon chemical affinity as the source of supply. The act of uniting to form a chemical product liberates an energy which assumes the form of heat or electricity, from either of which states it is convertible into mechanical effect. In contemplating, therefore, the application of electricity as a motive power, we must bear in mind that we shall still require to effect chemical combinations, and in so doing to consume materials. But where are we to find materials so economical for this purpose as the coal we derive from the earth and the oxygen we obtain from the air? The latter costs absolutely nothing; and every pound of coal, which in the act of combustion enters into chemical combination, renders more than two and a half pounds of oxygen available for power. We cannot look to water as a practical source of oxygen, for there it exist in the combined state, requiring expenditure of chemical energy for its separation from hydrogen. It is in the atmosphere alone that it can be found in that free state in which we require it, and there does not appear to me to be the remotest chance, in an economic point of view, of being able to dispense with the oxygen of the air as a source either of thermo-dynamic or electro-dynamic effect. But to use this oxygen we must consume some oxidizable substance, and coal is the cheapest we can procure." Much as electricity has been advanced towards the point of practicability, it is yet, as it was when Sir William Armstrong delivered his memorable address to the members of the British Association, the question of economy which presents the greatest drawback to its adoption as a motive agent. Sir William's concluding words on that occasion might stand as a permanent picture of the attitude of the scientific mind towards the ever-widening field of mental investigation: "The tendency of progress is to quicken progress," he said, "because every acquisition in science is so much vantage ground for fresh attainment. We may expect, therefore, to increase our speed as we struggle forward; but however high we climb in the pursuit of knowledge, we shall still see heights above us, and the more we extend our views, the more conscious we shall be of the immensity which lies beyond."

Sir William Armstrong was a member of the Coal Commission which sat in 1866, and also one of the most valuable witnesses. In 1859 a public dinner was given to Sir William, in the Newcastle Town Hall, the late Mr. Robert Stephenson and Sir George Grey being amongst the speakers on that occasion. This was one of the last public demonstrations in which Robert Stephenson took part. In the autumn of the same year he was laid to rest by the side of Telford, in Westminster Abbey. A handsome tribute of esteem was paid to Sir William Armstrong by his workmen when he was knighted. They presented him with an address in which they expressed themselves "proud and highly honoured" in being connected with the establishment of which he was the head. "We," they said, "who have occasionally been permitted to witness your indomitable perseverance in pursuing your experiments, under the most perplexing circumstances, with the most extraordinary zeal and energy, and have observed how frequently your disappointments and failures have been made the public entirely, and it thus became a further section of Armstrong Park. The donor stipulated that the natural features of the valley should be retained as far as possible, and that he and Lady Armstrong should continue to control it as long as either of them should live. There are several wells in the Dene, one of which is called King John's Well, local tradition connecting the name of this monarch with the vicinity, he having for some time inhabited a castle thereabouts, it is said. Many beautiful walks, avenues, bridges, cascades, grottos and dingles are to be met with, and there is a fine banquetting hall, as well as a picturesque old mill, with waterfall, which Northern artists frequently transfer to canvas. A massive and substantial high-level bridge, which makes the access to Armstrong Park easy from the town, was erected by Sir William himself at a cost of over £20,000. In August, 1884, the Jesmond Dene portion of the Armstrong Park was publicly opened by the Prince and Princess of Wales in the presence of a vast concourse of people, their Royal Highnesses being the guests of Sir William Armstrong, at Cragside, during their visit to Newcastle, and paying a visit to

Sir WILLIAM ARMSTRONG.

the famous works at Elswick. Cragside, the residence of the celebrated engineer, is, like Abbotsford, "a romance in stone and mortar." It is about a mile east of Rothbury, and stands on the banks of a rivulet called Debdon Burn. It was erected some quarter of a century ago, from the designs of Mr. Norman Shaw, R.A., and is a striking example of the Elizabethan style of architecture adapted to modern requirements. Its quaint gables, high-pitched, red-tiled roofs, floriated and twisted chimney-stacks of great height, lattice windows, and lofty tower, constitute a picture of great beauty. The interior is fitted up in the most perfect manner, evidences of wealth and taste being displayed on every hand. Over the richly-carved mantel-piece of the dining-room there is the motto, "East or west, hame's best," a sentiment to which the tenant of Cragside has, through all change of fortune, manfully clung. The mansion is lighted by electricity, the producing power being a neighbouring brook. "The brook, in fact, lights the house," says Sir William, "there being no consumption of any material in the process." In connection with the water supply to the estate, the originator of hydraulic machinery has, as might be expected, turned it to good purpose in a variety of ways, for not only does it work a turbine for a dynamo-electric machine, but it affords motive power for numberless kitchen, farm, and gardening operations about the house and the estate.

Sir William Armstrong's public benefactions are too numerous to be particularized. It may be mentioned, however, that he gave £1,450 for the erection of a new lecture-room for the Newcastle Literary and Philosophical Society, of which body he was president in 1860, in succession to Robert Stephenson; and in aid of the fund for St. Nicholas' Church, now the Cathedral, he contributed largely, one of his gifts being £500 towards finishing the external case of the organ, while he gave two donations of £500 each to the general fund, making £1,500 in all towards the Cathedral.

In 1872 Sir William Armstrong visited Egypt, and on his return gave four lectures to the Newcastle Literary and Philosophical Society descriptive of his visit. These lectures were afterwards republished in an attractive form, with maps, plans, and illustrations, and made a very interesting and valuable record of travel.

A portrait of Sir William, the cost of which was borne by public subscription, was presented to the Newcastle Corporation, in October, 1884, and will remain to future generations of Newcastle worthies, whose connection with the Town Hall will bring them within frequent sight of it, a fitting memorial of a noble intellect and a generous heart. Still greater recognition will follow.

Besides having filled the office of President of the British Association, Sir William Armstrong has occupied the post of President of the Institute of Mechanical Engineers, and of the Institute of Civil Engineers, at the annual meetings of which societies he has delivered important addresses. The University of Cambridge and that of Oxford have conferred upon him the honorary distinctions of LL.D. and D.C.L., while from abroad honours have been showered upon him in great numbers. The dignity of the Order of Francis Joseph has been granted him by the Emperor of Austria; Denmark has made him a Knight Commander of the Order of Dannebrog; from Brazil he has received the Order of the Rose; and the Government of Italy has nominated him a Grand Officer of the Order of SS. Maurizio-l-Lazaro.

Thorough in all things, of a large and generous heart, and prompted always by the noblest aims, Sir William Armstrong has in serving himself served his county and his country well. Perhaps the happiest tribute to his character and ability, of the many that have been paid to him during the last thirty years, was that which Mr. Joseph Cowen, M.P., uttered on the occasion of the banquet to the Prince of Wales in 1884. "No name can be more appositely associated with Northern industry and public spirit," said Mr. Cowen, "than that of the founder and master-mind of Elswick, who has cast his thoughts into iron, invested them with all the romance of mechanical art, and achieved wealth almost beyond the dreams of avarice. But he does not live for himself alone. He is happy when others can share in his bounty. Self-prompted, self-sustained, and, as regards his present profession, self-taught, he has worked his way through a thousand obstacles, and become one of the ornaments of his country, when his country is one of the ornaments of the world. He has interwoven the history of his life with the history of his native place, and has made one of the foundations of its fame the monument of his virtues. He has shown how the lofty aims of science and the eager demands of business can be assimilated, how the graces of social task and embellishment need not be sullied by vulgar prodigality. A man who has won renown in wider scenes feels, when his spirit wearies and his strength fails, that there is no admiration so acceptable, no applause so sweet as that which springs from those who have followed his career, sympathised with his struggles, and exulted in his triumphs. At such times and in such circumstances his heart warms to his own people and their hearts warm to him. There is this laudable reciprocity of sentiment between the citizens of Newcastle and Sir William Armstrong."

The only surviving member of the Elswick firm as originally composed is Sir William himself. In 1882 the works of Messrs. Charles Mitchell & Co., of Low Water, the eminent shipbuilders who had been associated with Sir William in the construction of the various ships of war which the latter had up to that time projected, were amalgamated with the Elswick works, a limited liability company being formed with a capital of £2,000,000.

Of this company Sir William Armstrong is the chairman, and the other members of the first directorate consisted of the following gentlemen: —Mr. W. D. Cruddas, Sir James McGarel Hogg, bart. K.C.B., M.P., Mr. Charles Mitchell, Captain Noble, C.B., F.R.S., and late R.A., Mr. Hamilton Owen Rendel, Mr. Stuart Rendel, M.P., Mr. C. W. Siemens, D.C.L., F.R.S., Lord Sudeley, Mr. H. F. Swan, Lord Thurlow, Mr. Percy G. B. Westmacott, and Lieut.-General Younghusband. The company was formed "to take over the businesses and properties of the united concerns of Sir W. G. Armstrong & Co. and Messrs. C. Mitchell & Co., and to carry on those businesses, with the addition of the manufacture of steel, and with such other additions and modifications as might be found expedient." In the prospectus it was stated that the business of the Elswick firm was that of mechanical engineers, with reference, more especially, to that system of hydraulic machinery, which originated with Sir William Armstrong, and to the manufacture of ordnance, with the development of which, as well as of the hydraulic system, the firm had been so largely concerned. The business also comprehended iron founding and smelting. It was also stated that of late years it had been the practice of the Elswick firm to design and contract for the supply of war ships, all of which had been built for them by Messrs. C. Mitchell & Co. This had led to the union of the two concerns, and it was then intended to develop that branch of the ship-building business which had reference to the construction of vessels of war, but without encroaching upon the building of ships for the mercantile marine and for passenger traffic. The growing demand for steel in gun-making and ship-building, as well as for numerous other purposes, had made apparent the expediency of adding steel-making to the other operations of the two firms, and that addition had been determined upon. The purchase price to be paid by the company was £1,575,000, of which the vendors took £1,185,000 in fully paid ordinary shares of £100 each, and £390,000 in cash. The combined amount of the valuations of the land, buildings, machinery, and fixed and loose plant was £878,558, to which had to be added £696,442 for stocks of materials, work in progress, floating capital, and the good-will, which was taken at three years' profits on an average of the previous five years. Having regard to the well-known character of the businesses, the continuance in them of those who had been so intimately concerned in their management, and the large interest retained by the vendors, the prospectus was confined to a simple statement of facts; but, as bearing upon the future prospects of the company, it was pointed out that a new era in artillery was marked by the recent adaptation of guns for enormously increased charges of powder, an adaptation which was initiated by the Elswick Company in the year 1877. The superiority of modern guns was so great that, it was thought, extensive re-armaments might be anticipated both in this and other countries. And, as also bearing upon the company's future, it was added that great and increasing as was the demand for steel for shipbuilding purposes, it was especially in relation to gun-making that steel works were required. The uncertainties and imperfections of steel had theretofore impeded its general adoption for artillery purposes, but recent improvements in its manufacture had removed all obstacles, and in recent guns of the largest size, steel in special forms had been much more extensively applied than previously, while, in some of the later designs for heavy guns, to be supplied by the Elswick Company, the use of wrought iron had been wholly discontinued. At the present time the engineering works at Elswick are under the active control, under Sir William Armstrong, of Mr. Percy Westmacott, who for thirty-four years has been at the head of this department. Mr. Westmacott is a past president of the Institute of Mechanical Engineers, and has had great practical experience in the carrying out of large engineering contracts. Mr. Hamilton Rendel is associated with Mr. Westmacott in the management of this branch of the business. The Ordnance Department has for the last twenty years been under the control of Captain Noble, who, before joining the firm in 1860, was secretary of a Special Commission on Ordnance, and has since gained great prominence by his experimental researches, in conjunction with Sir Frederick Abel, into the composition and properties of gunpowder and other explosives. Other posts of management in this important division of the works are filled by Major Jones and Mr. W. J. Hoyle. The former was, at one time, connected with the Royal Artillery, and was gunnery instructor at Woolwich being subsequently attached to the Experimental Department. Major Jones takes upon himself the duty of superintending the construction of the guns and testing them at the Company's ranges. Mr. Hoyle is the general manager of the Ordnance Department, and has been fifteen years in the service of Sir William G. Armstrong & Co. The war ship-building yard was under the direction of Mr. W. H. White until, at the request of the Admiralty, he was liberated from his engagement to the Elswick Company, which was for a term of years, in order that he might assume his present position of Director of Naval Instruction. Mr. White's former position at Elswick is now held by Mr. Watts, from the Royal Dock Yard at Chatham. The new steel works are controlled by Colonel Dyer, who was at one time assistant superintendent at the Government Small-Arms Factory at Enfield, and, more recently, served a seven years' engagement at Whitworth's works.

It would be impossible in the space at our command to give anything like a detailed description of the immense works which Sir W. G. Armstrong, Mitchell & Co. carry on on the banks of the Tyne. Still, the enterprise is of such an important nature that we cannot do less than attempt to give some notion of its leading features.

The river frontage of the Elswick works is over a mile in length, the various fitting, erecting, and finishing shops, foundries, forges, blast furnaces, machine sheds, and ship-building yards extending in an unbroken line the whole distance. On the opposite side of the works runs the Newcastle and Carlisle Railway, forming a border of rails for the entire length of the works, with sidings innumerable, and affording the fullest facilities for receiving and despatching material and finished objects. A complete network of rails traverses the works from end to end, and by means of small tank locomotives, or hydraulic capstans, heavy machinery and guns in course of construction can be transported from one part of the works to another with as much ease as one might move the pieces upon a chessboard. Three jetties run out into the river, and at each of these the water-pressure system enables a single workman, by the aid of hydraulic cranes, to perform marvels in the way of lifting and moving. One of these jetties is used for transferring heavy ordnance to the holds of vessels, and upon this is erected the hydraulic shears capable of lifting guns of the heaviest calibre. The hydraulic shears on this jetty is said to be the largest in the world, and is capable of lifting a weight of 120 tons. A peculiar feature in it is the direct-acting piston which takes the place of the ordinary chain. By this means perfect steadiness is secured, and greater safety is insured than with a chain, where one faulty weld would spoil all. At the east end of the works, adjoining Water Street, are the new steel works, with their melting furnaces, foundries and casting shops, reheating furnaces, forging presses and finishing shops, all now rapidly approaching completion. In close contiguity there is the Elswick ship-yard, which covers sixteen acres, and has a frontage to the river of about 2,000 feet. A busier scene than is presented by this mile-long factory could not be found anywhere. From morn to night the clangour of hammers resounds, the puffing and panting of all kinds of steam-controlled contrivances can be heard, clouds of smoke and tongues of flame are bursting forth in all directions, locomotives are moving to and fro with heavy trucks harnessed to them, hydraulic cranes are lifting and lowering great pieces of ordnance, and ships of war are lying at rest in the yards, their massive iron sides looming like great walls upon the surface of the water. Thousands of workmen are toiling cheerfully amidst this stirring scene, and the whole picture is Titanic in its elements as well as in its proportions. Then, in connection with this gigantic undertaking, there has now to be taken into account the extensive ship-building yard at Low Walker, five miles nearer the sea than Elswick, where the work of constructing ships of war is prosecuted with unsurpassed facilities. This was the ship-building yard which, previous to the amalgamation of 1882, was carried on with so much success by Messrs. C. Mitchell & Co. for over a quarter of a century, and is now capable of turning out 30,000 tons of shipping per year. The yard at Low Walker covers fourteen acres, and presents a frontage to the river of 1,000 feet. In busy times the firm of Sir W. G. Armstrong, Mitchell & Co. employ not fewer than 12,000 workpeople ; and the entire area occupied by the works is upwards of 70 acres.

It will be now our pleasing task to give some particulars of the different departments which constitute this extensive Tyneside concern. The Engineering works are entitled to be mentioned first, by reason of their being the starting-point of the firm's operations. They were commenced in 1847, and occupied but a small space of ground, their locality being about the central portion of the existing range of buildings. From that time for some years the progress of the place was a history of the progress of the introduction of hydraulic machinery into common use in various branches of industry. As each succeeding year saw some improvement brought about in the method of applying the new power, so its area of usefulness extended, and the Elswick works grew in proportion. At the present time the Engineering works cover an area of about nine acres, and comprise a pattern shop, pattern stores, brass foundry, forge and boiler and smiths' shop, chain makers' shop, fitting and turning shop, erecting shop, painters' shop, joiners' shop, and bridge and girder yard. It is chiefly in the construction of hydraulic cranes that the workmen in this department are employed. Some of these cranes are very giants. One of 160 tons has been erected for Malta, for lifting heavy pieces of ordnance in and out of ships. It is 96 feet high, and has a rake of 70 feet, and its cylinders weigh 33 tons. The total weight of the crane, including ballast, is 700 tons. Hydraulic-power gates for docks and sluice machines are also a leading feature of the Engineering department, one of the latest contracts of the company being for the Bute Docks, at Cardiff, for the largest wrought-iron dock-gates in the country, 43 feet high, weighing 280 tons, and intended to close an entrance 80 feet wide. Hydraulic hoists, drawbridges, grain-lifting machinery, and marine engines are also amongst the things which this department undertakes, about 1,500 men, allotted to day and night "shifts," being employed in the engineering division, who have to superintend the operations of about 300 machines, while nineteen powerful machine cranes and a number of small auxiliary hand cranes are utilized in lifting and moving the work from place to place as may be required. All the best and most recent labour-saving appliances are in use, some of which are special inventions not to be found in use elsewhere.

The Ordnance Department was added to the works in 1857, and now forms the most important division of the Elswick establishment. To begin with, it was merely experimental, but as soon as Sir William Armstrong's gun was adopted by the Government in 1859, its expansion was exceedingly rapid. The Ordnance works now cover about forty acres, and close upon 5,000 men, working night and day "shifts," are kept employed there. The extent and variety of operations in this department may be gathered from the following list of shops, &c.:—Pattern shop, forge, foundry, smiths' shop, 35-ton steam hammer, producers of gas for the furnaces, coiling shop, shrinking pits, joiners' shop, three gun-turning and boring shops, one gun-finishing shop, two gun-carriage shops, fuze-factory, projectile shop, &c. A writer in the *Pall Mall Gazette*, who recently visited this "supplementary arsenal," as he termed it, has described how a gun is made at Elswick. He says: "The interest of the visitor is centred upon an ingot destined to form the inner cylinder or barrel of a 12-in. 43-ton gun, whose fortunes we propose to follow, as they will illustrate all the processes through which a gun may be taken better than guns of greater size, as some of these come to hand forged hollow. As it lies longitudinally upon substantial supports, it is being rough-bored. The marks of the tool upon it show that it has come from the steel works rough turned." He then proceeds to describe in detail the various processes, and from his description we give a condensed account of the making of a gun. Before the boring machine was set to work upon it, we are told, a disc had been cut off each end, in order that its quality might be tested, testing pieces about four inches long being cut out of the discs. These pieces are submitted to a powerful machine, in which the ultimate breaking strain is ascertained by adding weight until a test piece breaks. In the case of the 110-ton gun, the minimum requirements of the Government are these: yielding strain, 11 to 15 tons to the square inch; amount of elongation, above 15 per cent. of the length tested; and breaking strain between 27 and 35 tons to the square inch. These tests refer to the steel in its soft state, as it comes from the steel works. Similar tests follow upon the steel being hardened by heat and tempered by being plunged into oil. The minimum requirements for the last series of tests for a 110-ton gun are: yielding strain, 25 to 33 tons to the square inch; amount of elongation, above 10 per cent. of the length tested; and breaking strain, 38 to 48 tons per square inch. Returning to the 43-ton ingot, which is being rough-bored, we find that at this first "cut" 9½ inches are being taken by a circular cutter out of the centre of the cylinder, which has an outside diameter of about 21 inches. With the barrel 30 feet long, the rough boring occupies more than a week, the machine working day and night. Having been rough-bored the barrel is toughened by being heated and tempered by being dipped in a pit of oil, operations all managed by means of hydraulic cranes. Then comes the process called "fine-boring," which comprises three separate borings, and in the case of the 43-ton gun, the rough "cuts" in this stage take two to three weeks each. With the 110-ton gun, a "pass" or "cut" occupies from three to four weeks. In the final boring from 700th to 1-10th of an inch, according to the gun, is left to be taken out. If the bore becomes torn or damaged by the breaking of a tool or seizure of the boring head, a barrel which may now be worth between £2,000 and £3,000 is utterly spoiled. After being bored, the barrel, having been turned in the lathe on the outside, is ready to receive the outer coats of steel with which a gun is built up. A gun is now a succession of cylinders of steel shrunk over each other, and each cylinder has to be treated in almost exactly the same fashion as the barrel or central tube. The 43-ton gun consists of five cylinders or layers, or four beyond the barrel. These cylinders run in thickness thus —barrel, 4¾ in.; second course, 5 in.; third course, 3¼ in.; fourth course, 3½ in.; fifth course, 4¾ in. The gun is thickest over the powder chamber—about 19¼ in.—because it is the seat of the explosion. As all these cylinders, except the inmost one, are in short lengths, the 110-ton gun comprises no less than forty-four pieces, apart from the breech-screw and the mechanism for closing it. The number of tests which this division of the gun into forty-four sections involves is 368, the barrel being credited with twelve tests for each end, while the other forty-three pieces have four tests taken from each end. The bore of the cylinders (apart from the original tube or barrel) is always made slightly less than the outside diameter of the cylinder which it has to cover. Expanded by the application of heat, the outside cylinder, or "jacket," is easily slipped over the inner tube, and as it gradually cools, the "jacket" grips with great power the inside cylinder. When the gun is thus being built up, it stands in a pit, where the cylinder "jacket" next to be placed upon it is brought by a hydraulic lift from one of a series of furnaces heated by gas (made in gas producers) and dropped over it. It then gradually cools, with a shield over it. We are told that "the grip of the cylinders upon each other grows in severity as the outside of the gun is reached, and the compression upon the original cylinder, of course, increases with each layer added. This fact discloses the application of an important principle in gun-making, at any rate as practised at Elswick. In a natural way, the great strain following upon the explosion of the charge of powder would fall heaviest upon the inner cylinder (or barrel) in which the explosion takes place; and the outer cylinders would only experience it in a diminishing degree—in a degree which diminished so rapidly as it approached the exterior part of the gun that it might almost be said to have disappeared by the time it reached the outside parts; for, as every one may see, there is a point under such circumstances where thickness ceases to add strength. This state of things is reversed at Elswick—the exterior parts prove the salvation of the gun. If the gun were made out of one piece of steel, the strain of the explosion would not travel far beyond the bore—the exterior parts would be so much useless metal; but by the sub-division of the gun into cylinders, each cylinder, having been put into a high state of tension by having been shrunk on, brings the full measure of its power to withstand strain to the support of the inner cylinder or bore, and the other parts of the gun—this, at each successive layer reinforces the accumulated resisting power of the whole mass." In this way every part of the gun is made to bear a uniform share of the work. The rifling of the gun is next proceeded with. The "cutter" is directed in its twisted movements by a pinion and rack, which, in their turn, are acted upon by wheels rolling along a slightly curved track or framework of iron. The "cutter"—which only cuts in coming out—goes up each groove from eight to twelve times, according to the hardness of the metal, and as there are eighty groves, in many instances it travels along the gun 800 times. "The greatest conceivable care has to be exercised in the rifling of these huge guns, as the slightest departure from the true course may now destroy material and work worth together £15,000." The gun has then to be "chambered" and fitted with the "breech-screw;" after that a number of ingenious contrivances are applied, the object of which is to make the firing of the gun a simple and safe operation. When the gun has been completed it is taken to the company's range in the moorland district of Ridsdale, thirty-five miles north-west of Newcastle, where Major Jones submits them to the final proof. The moor adjoining Sir William Armstrong's seat at Cragside, forty miles from the city, is the place selected for trying machine guns.

A very large variety of guns is produced at the Ordnance works at Elswick, in addition to the big guns, the course of invention never being allowed to rest in respect of the introduction of improved artillery. They make a mountain gun which will carry a 7-lb. shell a distance of from 3,000 to 4,000 yards. The gun weighs 400 lb., but is divided into two parts at the trunnions, and can thus be carried by two mules. "Six mules carry gun, carriage, ammunition, and gear," says the writer from whom we have been quoting; "the gun proved of great service in the recent wars in Afghanistan and South Africa, and a large number have been made since it was designed." The Gatling machine gun, which has been so greatly improved recently that it can now fire from 800 to 1,000 shots per minute, is made by the Elswick company, who are able to turn out a thousand of these guns per year. A rapid firing gun, to which the name of the Elswick Cannon Revolver has been given, is also one of the more recent novelties manufactured by Sir William Armstrong's firm. The gun takes a metallic cartridge (shell and cartridge combination) 8¼ lb. in weight, and fires from ten to fifteen shots per minute, with a velocity of 1,700 feet per second. Another novelty in guns is a steel-riband gun. It consists of a steel cylinder barrel with ribands of steel wound over it in successive layers, a mode of construction which minimizes the danger from flaw. There are fourteen layers of riband in a 10-in. gun, which has a thickness of walls of 11 inches, of which three inches is of steel riband. "A 10-inch 21-ton gun, twenty-seven feet in length, with a charge of 230 lb., starting a projectile weighing 450 lb., has given a velocity of 2,025 feet per second, which means a stored-up energy equal to 12,800 foot-tons, as contrasted with a velocity of 1,900 feet per second, or an energy equal to 10,000 foot-tons, obtained from a 25-ton gun of the same bore and the same length, built on the ordinary system, with a charge of 180lb. and a projectile weighing 400lb." The Elswick company have also introduced a system of re-lining guns, which will commend itself to military authorities as an economical contrivance deserving of every encouragement. In the making of gun carriages and mountings a large force of workmen is employed.

The manufacture of projectiles is largely carried on at Elswick. As we have seen, one of the features of the Armstrong gun when it was first invented and approved was a new kind of projectile. Several shops are now devoted to the making of projectiles by Sir William Armstrong's firm, who make common shells, shrapnel shells, steel shells for armour plates, Palliser shells and case shot. The capacity of the shells is largely increased by their being made of steel instead of cast iron as formerly. "The use of steel," says the writer in the *Pall Mall Gazette*, "permits of a considerable reduction in the thickness of the walls of the shell, which, in fact, constitute the shell. This allows of a much larger charge of powder, thus a common shell for a 6-inch gun now holds 12lb. of powder, as against 7lb. in the cast iron form. The shrapnel shell is a bottle-nosed cylinder of steel, forged and bored out. They are made in all sizes, from 7lb. in weight up to 1,700lb. and three times the diameter is usually the measure of their length. These shells are entirely filled, usually with hardened lead bullets of about 1oz. in weight. The bullets are put in in layers, though not with mathematical exactness—they are merely shaken together. Melted rosin is poured in among them, in order to fill up the interstices; else, when the heavy shock of the explosion came, they would be all flattened against each other. The steel shell for penetrating armour plates is first forged, then bored, and finally tempered, and is constructed to carry such an amount of powder as will cause it to explode and add its pieces to the destructive splinters from the broken plate. A bag of 7lb. or 8lb. of powder will suffice for a shell weighing 450lb. Every shell has a copper ring in three grooves, which encloses it towards its base. "Before the charge is fired, this fixes the shell in its place, and when it has been started on its journey along the barrel, it secures for it the full advantage of the rifling by causing it to rotate. If a spent shell is examined, it will be found that not only have the grooves disappeared, but that the copper band has been driven into correspondence with the rifling of the gun." The plant at Elswick, we are told, is equal to turning out 500 rounds of projectiles, with their fuzes and cartridges, for every gun made per year.

Before quitting this part of our subject, it may not be out of place to quote Captain Noble's opinion in regard to the armaments of the future. The character of the gun of the future, he considers, will be influenced by the absence or presence of armour on ships of war. If ships drop armour plates altogether, he thinks there will be no occasion to increase the size of the guns; but if we found them adding to the weight of their armour, we must have guns capable of coping with it. He does not think the rage for armour will continue. He considers that an armour deck, which might be of any thickness that is necessary, would sufficiently meet the necessities of the case. His opinion is that all guns, or nearly all guns, unless they are inside turrets, or barbettes, ought to be placed on the upper decks to avoid the effect of shells below, and that shields or other local protections should be used to protect the gunners from the fire of machine guns, and from shrapnel and splinters of shell. Guns must not be below deck (unless they are protected by armour), because modern shells falling there would be very disastrous in their effects, the great explosive force having to expand itself in so small a space. If the armouring of ships is persisted in, we may easily go on to produce much larger guns. With the present most powerful gun, the 105-ton gun, the energy of the shot is something like 54,000 foot-tons; but if they were to increase the length of the gun to 40 calibres, they could, with the same charge of powder, run up the energy to over 70,000 foot-tons. No difficulty would be experienced in making guns much larger than they are now. If they were asked, they could double the size of the present biggest guns. Captain Noble, however, does not think that the best thing to do.

The new steel works which the company have started, under the direction of Colonel Dyer, will cover, when complete, an area of a little over ten acres, six-and-a-quarter acres of which will be under cover. The firm have had some difficulties to overcome in the nature of the ground, which is situated on a slope, but they have surmounted them so well that they have turned out a decided advantage. By having had to build the steel works in four terraces they have made the regenerating chambers and the valves more accessible, by reason of their being above ground, so that all material can be brought by rail to the spot required, at a great deal less expense than if the works had been constructed on a level on the old system. There are two 25-ton Siemens' furnaces, each capable of producing 150 tons of pure steel per week. There are six circular gas producers, for the production of gas for consumption in the furnaces. The various processes of the steel manufacture are carried on on the most approved principles.

The shipbuilding department, which is of course chiefly carried on at Low Walker, has during the last few years turned out some very special and novel vessels of war, and is likely to attract more attention than ever in the future. The fame of the firm's war-ships has spread to all the nations of the earth, and the important contracts which have been completed for foreign governments of late by Sir William Armstrong, Mitchell & Co. have shown that they are amongst the leading war-ship builders of the world. In the old days, before the amalgamation of the two firms which now constitute the company, the whole of the gunboats and cruisers contracted for by Sir William Armstrong's company were built at Mitchell's yard, and included the first of the coast-defence gunboats, designed by Mr. George Rendel and named the "Staunch," all the alphabetical gunboats built for China, the 16-knot heavily-armed cruisers constructed for China and Chili, and the later and larger 18-knot cruisers "Esmeralda" and "Giovanni Basan," built for the Chilian and Italian governments respectively. There are ten building berths at Low Walker, where 2,500 men are employed.

It seems somewhat strange that one of the finest vessels of war, and in fact the fastest sea-going war-ship afloat, should have been built by the firm of Sir William Armstrong, Mitchell & Co., for the Chilian navy, which in the "Esmeralda" possesses a combination of offensive and defensive qualities altogether unsurpassed. At the annual meeting of the firm in October 1884, the chairman, Sir William Armstrong, made special allusion to this vessel and its class as inaugurating a new era in the construction of ships of war. "The 'Esmeralda,'" said Sir William, "is the swiftest and most powerfully-armed cruiser in the world, and although she has sufficient coal-carrying capacity to enable her to keep the sea for an unusual length of time, she has nevertheless the great advantage of being comparatively of small dimensions. She is unarmoured, as all cruisers ought to be, but as her boilers, engines, and magazines are all below water-level, and are covered by a strong steel water-tight deck, which is also below water-level, she is almost absolutely secure against the worst effects of projectiles. The guns are shielded against small-arm machine gun fire, and by means of mechanical appliances require very few men to work them. Her floatation and stability when pierced in exposed parts are secured by methods which are now generally acknowledged to be efficient, so that she would be very difficult to sink or disable, even if opposed to an ironclad. Happily she has passed into the hands of a nation which is never likely to be at war with England, for I can conceive no more terrible scourge on our commerce than she would be in the hands of an enemy. No cruiser in the British navy is swift enough to catch her or strong enough to take her. We have seen what the 'Alabama' could do—what might we expect from such an incomparably superior vessel as the 'Esmeralda'?"

The "Esmeralda," of which a model was on view, as we have stated, in the Inventions Exhibition, is such a remarkable vessel that it merits a more detailed description. Her construction began early in 1882, and occupied rather more than two years, and could have been completed in less time if the war with Chili and Peru had continued, and made its earlier delivery a necessity. The vessel embodies all the most recent improvements. She is built of steel, exceedingly well sub-divided, furnished with powerful steam pumps, fitted with beautiful hydraulic mechanisms for loading and working the heavy guns and for steering, cries elecrvtric searching light, is lit by electric lamps, and has magnificent accommodation for officers, crew, and stores. The real secret of her rapid progress is to be found in the fact that her design was thoroughly well-considered, her armament definitely decided upon, and all the important details arranged before the contract was concluded. Expensive and tedious alterations were thus avoided, and the whole work having been planned and executed under a single control, delays, that so often occur when separate departments or separate firms undertake different portions of the work, were avoided. Throughout the operations, a competent Chilian commission watched the construction. The principal features in the armament of the "Esmeralda" may be regarded as a natural development from the armaments of the swift cruisers previously designed and built by Sir W. G. Armstrong & Co. To Mr. Rendel must be attributed the realization of the idea of mounting heavy guns on comparatively small but swift vessels of the cruiser class. The first examples were two or three vessels of 210 feet in length, 1,300 tons displacement, and 16 knots speed, built about four years ago for China and Chili. These small vessels were very cleverly arranged, and each carried two 25-ton guns, with hydraulic mechanism, besides lighter guns. They had a good coal supply, the bunkers being arranged over engines and boilers as a protection; and they have proved themselves capable of making long ocean voyages alone. But their small size, and the nearness of the heavy bow and stern-chase guns to the water, made them incapable of fighting efficiently at full speed in heavy weather at sea; and this fact, with others that need not be mentioned, naturally led to the consideration of the possibility of producing more powerful and swifter ships of larger size, but similarly armed as regards the heavy guns. Further, the question of protection for the vitals of the ship—engines, boilers, magazines, and steering appliances—had also forced itself into greater prominence during the period succeeding the construction of the first cruisers, having been much discussed at an even earlier date. Protection must here be considered as protection against shell-fire, the form of attack most fatal to unarmoured ships of all classes. Such protection is now looked upon as an essential quality in war-ships of any considerable size, and in the case of the "Esmeralda" and other vessels of this class built by Sir William Armstrong, Mitchell & Co., it is provided in a very remarkable degree.

The three cruisers which the firm are constructing for the Japanese government are each 300 feet in length, 46 feet in breadth, draw 18½ feet of water, and are about 3,600 tons displacement. They have twin-screw engines, which are to develop 7,500 horse-power at least, and their estimated maximum speed is from 18 to 18½ knots. The armament includes two 28-ton 26-centimetre guns, mounted on centre-pivot automatic carriages as bow aud stern chasers. These guns are worked and loaded by hydraulic mechanism. On each broadside there are 15-centimetre guns of 5 tons each, also on centre pivot automatic carriages of Elswick design; and along the broadsides there are also placed no less than ten 1-inch machine guns and two rapid-fire guns. There are two military masts, in the tops of which four of the improved Gatling guns, made at Elswick, will be mounted. In addition to the gun armament, each vessel will have a complete armament of locomotive torpedoes, ejected from four stations, two on each broadside, situated at a small height above water. There is also a very powerful ram bow, formed of an immensely strong steel casting, which projects forward under the water, and would deliver a terrific blow upon the underwater portion of any ship attacked. A strong protective deck, covering the spaces occupied by machinery, boilers, magazines, and steering gear, is a leading feature. It is of steel, has a thickness varying from 2 to 3 inches, and has a total weight of over 450 tons. There are likewise minute cellular sub-divisions of the space above the protective deck and below the main deck, which is about 6 feet above water. Large quantities of coal can be stowed in these cellular subdivisions. There are two separate engine-rooms and two separate stoke-holds.

At a time when the condition of the English navy is a matter of great public concern, it is of importance to note what an eminent firm like that of Sir William Armstrong, Mitchell & Co. are doing in the way of naval construction, and if the British government do not take a lesson from the firm's operations for foreign governments in the building of the new class of vessels to which we have referred, they will probably find, if we should suddenly be plunged into war, that our navy is old-fashioned and ineffective, where it ought to be most powerful. Looking at this question from the standpoint of patriotism as well as that of a builder of ships of war, Sir William Armstrong recently said, "It is surprising that so much apathy should be displayed regarding the unprotected state of our commerce. There is at present a well-founded scare about the insufficiency of our navy, but the cry is chiefly for more ironclads, which are of little or no use for the protection of commerce, and we hear but little of the need of fast cruisers to save us from depredations at sea. No nation is so dependent on commerce as we are—without imported food we should actually starve. We have beyond comparison the most numerous mercantile navy in the world, and our ships are spread over every sea; yet our fleet of swift cruisers is perfectly insignificant in relation to the number of ships to be protected or the extent of ocean to be covered. Nothing can be more certain than that in the event of war our merchant shipping would be attacked; and if an enemy contented himself by assailing our commerce with a fleet of swift and powerful steamers, he would give the go-by to our ironclads and inflict fatal injury upon us, with little cost to himself. As to adapting our mercantile and passenger steamers to act as cruisers in case of emergency, nothing, in my opinion, can be more delusive—they would simply supply victims for 'Esmeraldas.' But, independent of the protection of commerce, ships of the 'Esmeralda' class have much to recommend them. They will never be out of date, while ironclads often become obsolete almost as soon as made. Swift cruisers can ram, and use torpedoes, just as well as armour-clads, and in fact much better, for they have the advantage of superior quickness and handiness. It is only in an artillery fight that an armour-clad has any advantage, and rams and torpedoes will probably have quite as much to do with the fate of naval battles as artillery."

There can be no doubt of this, that in the event of England going to war, the firm of Sir W. G. Armstrong, Mitchell & Co. must necessarily take a chief part in the providing of our guns and ships, and it is gratifying to know that, however lethargic the naval authorities of the country may be in regard to the future of the navy, there are brains and hands at work on the Tyne on which we may rely for valuable aid in keeping up our naval supremacy.

THE
HENRYS OF MANCHESTER AND BRADFORD.

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IN point of significance and comprehensiveness, few trade terms can compare with the time-honoured title of "merchant." The word runs through the entire sphere of buying and selling, and is tacked on to the humble dealer in rags as well as to the lordly trafficker in gold. *Il y a fagots et fagots.* From the towering commercial heights whereon the De' Medici family gained treasure and power, to the lowest rung of the merchant ladder, there is a vast and profound space. At one end we touch the borderland of kingly dignity and influence; at the other we are only one remove from the beggars who solicit alms from us in the street. In many notable instances the successful merchant-prince has himself travelled over the entire space, beginning as a penniless beggar-boy, and ending as a titled millionaire. The trading annals of England have frequently recorded, in slightly varied forms, the story of Dick Whittington, and at no period of our commercial history could we point to so many men as now, who have worked themselves up from the humblest positions to opulence and rank. This is essentially the era of self-made men; and the best part of the world's greatness is of their making. The vast commercial houses, which have been built up by the well-directed energy of our chief merchants, throw the enterprises of previous times into the shade. These men have not only made their own fortunes, but, by opening up fresh markets in various parts of the world, have been the means of spreading wealth in many directions, giving better employment to the labouring classes, affording an encouragement to inventive genius, and always acting as the true pioneers of commerce. They have explored the universe in the interests of industry, and, through their intervention and by their direction, the looms and spindles of England have been kept running from year to year, and, in spite of the periods of trade depression, which have now and then intervened, have yielded both individual wealth and general prosperity.

Foremost amongst these merchant-pioneers have been the men who have taken part in originating and developing the great mercantile house of A. & S. Henry & Co., whose operations extend over all parts of the civilised and uncivilised globe, and whose well-known establishments at Manchester, Bradford, Huddersfield, Glasgow, and Belfast embrace every branch of our textile industries.

The Henrys are an Irish family, a fact which may have some bearing possibly on the circumstance that the present head of the firm, Mr. Mitchell Henry, sat for several years in the House of Commons as the representative of an Irish county constituency. The first of the Henrys to make a name in the commercial world was the late Mr. Alexander Henry, who was born in the north of Ireland in 1766, emigrated to America in 1783, settled in Philadelphia as a clerk, and subsequently became one of the most successful merchants in that city, retiring with an ample fortune in 1807. His career in the City of Brotherly Love was at once eminent, useful, and unostentatious. For many years he was one of the ruling elders of a leading Presbyterian church in Philadelphia, and in all philanthropic and educational movements and institutions took a lively interest, and assisted them nobly by his pecuniary contributions. He was one of the men who helped to lay the foundations of Philadelphia's commercial greatness. At the time of his settling there, a desperate attempt was being made to establish the textile industries in Philadelphia, and had it not been for the efforts of a few such energetic men as Alexander Henry, the probability is that the manufactures which have since risen to such importance in that city would have drifted elsewhere. As it was, Mr. Henry had the satisfaction of seeing the city of his adoption extend its industrial power at the same time that his own private commercial undertaking was making rapid headway; and when he retired in 1807, and left the active management of the business to younger hands, the name of Henry had become a revered and honoured one in the commercial history of the United States.

The name, however, was destined to acquire a still wider influence in the years to come, for another Henry—also called Alexander Henry, and the nephew of the eminent merchant of Philadelphia—had entered upon a commercial career, resolved to follow in his uncle's footsteps. This young man, brought up under the care of his uncle, inspired by a desire to emulate him in his personal virtues and public zeal, and possessed of a strong inclination to launch forth into new commercial ventures, soon found active employment for himself. America was yet in its infancy as far as regarded commerce, and young Henry's aspirations required a wider sphere of operation, if they were ever to win complete fulfilment; so in 1804 he came over to Manchester, and began business in Palace Street, retaining the American connection, and making it his chief object to bring the United States into closer commercial contact with England. His business increased beyond his anticipations, and he found it necessary, before long, to remove to larger premises, in Spear Street. He now took his younger brother, Mr. Samuel Henry, into partnership, and the firm of "A. & S. Henry" became one of the leading houses in Manchester.

The factory system had not yet been completely built up, and the era of great "cotton lords" had hardly been entered upon, the power of the steam-engine was beginning to spread into all departments of industrial labour, and the inventions of Arkwright, Crompton, and others were rapidly revolutionising the trade, which had Manchester for its centre. The means of production were being multiplied a thousandfold, and it was for the merchants of the large manufacturing towns of the North to find customers for this increased supply of fabrics. Into this all-important work Messrs. A. & S. Henry threw themselves with remarkable energy. They sent their envoys out to the remotest parts of the earth in quest of races and peoples desirous of being re-clad, devoting their attention chiefly, however, to the North American continent, in the various cities whereof they quickly established an extensive and profitable connection. Messrs. A. & S. Henry were the leaders, so to speak, in the English trade with America, and for many years were the chief exporters of manufactured goods to that country. Their house came to be known as the American house; though in later years many other American houses have sprung up in Manchester and Bradford. The Henrys did not confine their operations to dealing simply in Manchester cottons, but gradually laid themselves out for the supplying of all descriptions of fabrics—cottons, woollens, worsteds, silks, and what not—and opened branch warehouses in all the principal commercial centres of this country. At Leeds they placed themselves in the midst of the heavy woollen district; at Huddersfield obtained full command of the fancy cloth trade; at Bradford gained ready access to the makers of worsted goods; at Belfast were put in direct communication with the manufacturers of Irish linen; and at Glasgow were able to obtain a firm footing amongst the various producers of Scottish textiles. At each of these places managing partners were established, with separate and distinct interests, but all responsible to, and in direct connection with, the parent house at Manchester, which retained, and still retains, the supreme control over all the concerns. With these numerous fields to draw upon, and with an ever-increasing connection abroad, no wonder that the firm prospered. The amount of personal supervision given to the business affairs of the house at this time by Messrs. Alexander and Samuel Henry was something marvellous; early and late they were to be seen at their posts, and there was not a single detail of the trade to which they did not pay attention. Frequent voyages had to be made between this country and America by one or other of the brothers, and long and dreary must the voyages have seemed to them, eager and ardent as they were. In those days the average time of passage was thirty days, but occasionally, by stress of weather or other circumstances, the vessels were retarded, one time Mr. Alexander Henry being seventy days in going over. Mr. Alexander Henry crossed the Atlantic upwards of thirty times, but never made the voyage after the introduction of steamers.

In 1836 Mr. Henry built the present large warehouse in Portland Street, Manchester, in order to keep pace with the firm's increasing operations. By this time they were doing a greater trade with America than any other house, and their business with foreign countries generally was much augmented. So matters continued, without any particular incident occurring, down to the year 1840, when, by a terrible disaster which took place in America, the house had a gloom cast over it that was not easily dispelled. On the night of the 13th of January 1840, Mr. Samuel

Henry was a passenger on board the American palace-steamer Lexington, sailing from New York to Providence. The ship took fire, and all the passengers and crew, with the exception of some two or three individuals, lost their lives. "Amongst those who perished," said *Hunt's* (N.Y.) *Merchant's Magazine* of February 1840, "there was no one more generally beloved and respected than Samuel Henry, Esq., of Manchester, England. . . . In his business intercourse with his fellow-men, rigid uncompromising integrity marked his character. No one knew better the true requirements of a merchant, or the generosity becoming a man; and throughout his life he ever maintained the strictest consistency of high mercantile principles and the most generous liberality. During the commercial distress which affected every class in the country for the past three years, Mr. Henry was here, yielding relief and assistance to those whom misfortune had crushed; and there are many, in this city and elsewhere, who will bear testimony of his open confidence and generous forbearance, when they were most needed and appreciated. Indeed, in all his business transactions there was a free honest spirit, a manly straightforward course of conduct, which won the esteem and confidence of all with whom he came in contact."

When the news reached England, it was remembered that on the same night that Mr. Samuel Henry met his death so lamentably in America, his elder brother, Mr. Alexander Henry, was one of the guests at a free-trade banquet given in Manchester. Both brothers had been stanch advocates of the principles championed by Cobden and Bright, and were prominent members of the Anti-Corn-Law League. In 1846, Mr. Alexander Henry was returned to Parliament, unopposed, jointly with the late Mr. William Brown, for South Lancashire, for which constituency he continued to sit during Lord John Russell's Parliament, taking an active interest in all measures having for their object the promotion of commerce and the advancement of education. He steadfastly adhered to the principles of reform, which he had had the courage to avow at a time when they were unpopular, and lived to see and take part in the passing into law of many of his favourite schemes. He was one of Cobden's most attached friends, and a great admirer of Kossuth. On the two occasions when Kossuth formally visited Manchester he was received by Mr. Henry as his personal guest. On the first visit, the Hungarian patriot was welcomed with acclamation by the people of Cottonopolis; on the second visit he found the tide of popular favour turned against him, in consequence of the part he was supposed to have taken in connection with certain political intrigues; but his friend, Mr. Henry, stood manfully by him, and received him with as much warmth as ever. Mr. Henry was no mere "fair-weather friend"; when once he had made up his mind that a man was worthy of his trust and confidence, and satisfied himself that his motives were such as honour and justice would approve, he was not the one to desert him in the hour of trial and distress. Although he attended assiduously to his parliamentary duties, Mr. Henry never relaxed his interest in the great business which he had been mainly instrumental in creating; he was still frequently to be seen at the Manchester warehouse busying himself with all that was going on, and assisting his partners with the best advice and experience. He continued to exercise a controlling influence over the affairs of the firm until his death in 1862, when the sorrow which fell upon the house of A. & S. Henry & Co. was shared in by the people of Manchester generally, Mr. Henry having greatly endeared himself to his fellow-citizens by his many munificent acts.

The *personnel* of the firm now underwent considerable change. Mr. John Snowdon Henry, who had for some time been actively employed in the business, and Mr. Mitchell Henry, the two sons of Mr. Alexander Henry, became principal partners, and they, in conjunction with those other members of the firm who had been taken into partnership by Mr. Henry, continued to carry on the business with undiminished success. Mr. J. Snowdon Henry was elected M.P. for South-East Lancashire in November 1868, in the Conservative interest, and represented that constituency down to 1874. He engaged with much earnestness in many public movements, and was at one time Major of the 40th Lancashire Rifle Volunteers. In 1869 he retired from business altogether. He has a country seat at East Dene, Bonchurch, in the Isle of Wight, and a town residence in Piccadilly. His connection with the firm of A. & S. Henry & Co. lasted through a number of very prosperous years, and when he retired it was as the possessor of a handsome fortune.

Mr. Mitchell Henry now holds the leading position in the firm; but, strange to say, has never taken any actual part in the transaction of the business affairs of this gigantic commercial undertaking. Born at Ardwick, near Manchester, in 1826, educated privately and at University College, he early in life devoted himself to the study of medicine, and at one time held an eminent position in that profession. He attended the St. Bartholomew's Hospital School of Medicine, and was made a member of the Royal College of Surgeons in 1847. In 1854 he became, by examination, a Fellow of the same college, and for some years was assistant-surgeon at St. Batholomew's Hospital. He acted as surgeon and lecturer on medical jurisprudence for a considerable period at the Middlesex Hospital, and was in practice in London as a consulting surgeon. When his father died, however, and he found himself placed in an independent position, he gave himself up, in a great measure, to public life, and took leave of the medical profession altogether. Although not engaging himself directly in the business of his firm, he possesses a thorough knowledge of all the affairs of the partnership, keeping himself daily posted in the firm's transactions, and to a considerable extent directing its operations. As early as 1856 he tried to get into Parliament, unsuccessfully contesting Woodstock ; and in 1868 he placed himself in the hands of his party at Manchester, and again met with defeat. All this while he was taking a prominent part in the various political movements which came before the country, and in many instances his advocacy proved of good service to a good cause. At length, in 1871, his opportunity for entering Parliament came, and he was elected for County Galway, along with Major Nolan, and has sat for that constituency up to 1885, when, finding himself not altogether in sympathy with a portion of the constituency, he placed his services at the disposal of one of the Glasgow Parliamentary Divisions, and was duly elected. At the general election of 1886, however, Mr. Mitchell Henry lost his seat in Parliament by the sudden forcing into prominence of the Home Rule question. Mr. Henry's political history has been somewhat curious. At one time he was regarded as one of the leaders of the Irish party, and was perhaps the most popular member in Ireland, after Mr. Butt, although he never took up his position in the House of Commons along with the Irish members. Mr. A. M. Sullivan, speaking of Mr. Mitchell Henry's writings on Home Rule, at a time when the question had not come within the touch of practical politics, described them as "the most honest, clear, and specific that he had ever seen." After the death of Mr. Butt, and the ascendency of Mr. Parnell as the prime mover of the Irish agitation, Mr. Henry found himself unable to unite with the party in all its action, and consequently assumed the independent attitude on Irish matters which he has ever since consistently maintained.

The part that he has played in parliamentary life is well known. While warmly espousing the cause of Home Rule, he all along contrived to place himself on a more independent and more intelligible footing than the majority of Home Rulers, and there is no doubt he has been one of the strong elements of the party. The manner in which he set himself to solve the Irish grievance entitles him to be considered a practical philanthropist, and a true friend of the Irish people. In 1862 he acquired the sporting rights over a large tract of country in Connemara, and, becoming attached to the place, eventually bought an estate there, upon which he built a residence, where he resides for the greater part of every year, and where he has the opportunity of carrying out those agricultural experiments which have always had so great an attraction for him. The result of his experience was to convince him that the true mode of treating the Irish difficulty was to regard it less as a political than as a social matter; and, in Parliament and out of it, he frequently expressed the opinion that no changes in the laws, whether as respects the land or otherwise, would prove effectual for the removal of Irish discontent until the condition of the population was improved by making the country in which they lived more habitable for man. By his own efforts he has shown what can be done by judicious outlay; and he has always contended that if some portion of the better class of the waste lands were acquired by the State, it would be possible to settle upon them, in comfortable circumstances, numbers of small tenants who have heretofore lived in a chronic state of destitution. The practical suggestion he makes is that, after suitable tracts of country have been acquired by the Government for this purpose, works of reclamation should be constituted, to be carried on by Irish labourers, who would be paid weekly wages, and would be housed in temporary dwellings, and that when, in the course of about two years, these tracts have been made sufficiently fertile to support families, they should be divided into farms of thirty acres, which should be let to the labourers who have worked upon them, at rents calculated upon the basis of a percentage on the original outlay in the purchase of the estate and of the amount paid in wages, together with a small fund to pay off the whole sum in the course of a term of years, when the holder would become the proprietor of the fee simple of a well-ordered farm, and thus become as deeply interested in upholding the rights of property, and securing the observance of the laws, as the larger proprietor could be.

Mr. Mitchell Henry's efforts in regard to the reclamation of waste lands have indeed attracted much attention. A special correspondent of the

Times has described Mr. Henry's experiments as of the greatest importance to all those who have at heart the development of Ireland's agricultural capabilities. "Tourists passing Kylemore Castle," he says, "in view of some of the most marvellous rock scenery in the United Kingdom, where the Twelve Pins present their precipices of black and grey, and whole faces of snow-white quartz, with intensely bright green slopes between, may have scarcely noticed the operations of drain-cutting and transporting of hard material, which are likely, as an example, to exert a commanding influence over the future of, perhaps, hundreds of thousands of acres of now wasted bog." The cost of these reclamations has averaged 13*l.* an Irish acre hitherto, and in some instances the crop of turnips grown in the first year has gone far towards recouping the outlay. The gold medal of the Royal Agricultural Society was recently awarded to Mr. Mitchell Henry for drainage in the West of Ireland, and, one way and another, this member of one of the leading commercial firms in the country has succeeded in making himself a decided authority on momentous agricultural matters. The appointment of an Agricultural Commission to consider, amongst other things, the question of the reclamation of waste lands in Ireland, and the selection of Mr. Mitchell Henry as a member of that Commission, have helped the solution of the Irish land problem considerably. In these and other matters connected with the amelioration of the condition of the Irish people Mr. Mitchell Henry has shown untiring zeal; and if his English friends feel regret that he should have identified himself so intimately with Irish questions as to cut himself adrift in some degree from more general political projects, his Irish friends, on the other hand, have the satisfaction of feeling that he is still better employed, and men of all shades of opinion will give him credit for honestly and earnestly striving to come at the best and readiest means of assisting the inhabitants of Ireland. In following the course of Irish political reform during the past few years, and especially keeping in mind the work that Mr. Gladstone has done in this direction, it will be seen that Mr. Henry has been generally in advance of practical legislation in his views on Irish questions.

The other members of the Manchester firm of

A. & S. Henry & Co. since 1847 have been Mr. George Wildes, Mr. W. R. Johnson, Mr. W. F. Scholfield, Mr. Thomas Barton, Mr. N. Carter, Mr. H. Hitchcock, Mr. John Mitchell, Mr. John Moseley Williams, Mr. James Dawson, Mr. Thomas A. Corry, and Mr. John Laycock. The three last-named gentlemen constitute the present Manchester partnership.

Mr. John Mitchell was connected with the firm from 1844. Until 1868 he was concerned in the management of the Leeds and Bradford branches, and resided principally at Bradford, in which town he acquired considerable influence as a public man. He was for a long period a member of the Bradford Town Council, of which body he was created alderman. Like Mr. Alexander Henry, he was a pronounced Free-trader and one of Kossuth's most intimate friends and admirers. When Kossuth visited Bradford, Mr. John Mitchell entertained him, and he always warmly advocated the Hungarian's cause. During the time that the French Commercial Treaty was being negotiated, Mr. John Mitchell rendered much useful assistance to Mr. Cobden—assistance which the great Free-trader gratefully acknowledged. On commercial matters Mr. John Mitchell was always regarded as a high authority, and both in Yorkshire and in Lancashire did much good work for the advancement of the interests of trade. In politics Mr. John Mitchell was what is called an advanced Liberal. When the late Mr. W. E. Forster was first brought forward as a parliamentary candidate for Bradford, Mr. John Mitchell was his chairman, and seconded Mr. Forster at the hustings. Previous to that he and acted as chairman for the well-known political veteran and Corn Law Reformer, General Perronet Thompson. After removing to Manchester in 1868, Mr. John Mitchell was made a member of the Manchester Chamber of Commerce, of which important public body he was a director. In practical knowledge of commercial affairs, and in sound business judgment, this active member of the Manchester partnership had few superiors. He was indefatigable in his attention to the business concerns of the firm; and on all public matters bearing on commerce his opinion was greatly valued. His death in September, 1884, at Lytham, deprived A. & S. Henry & Co. of the services of a partner whose guidance had ever been in the direction of advancement, and whose excellent personal qualities had greatly endeared him to those with whom he had been associated.

The remaining Manchester partners have all been with the firm many years, some of them having risen from the humble position of warehouse-boy to that of master. Mr. Alexander Henry invariably acted upon the principle of rendering the interests of his best and most industrious servants identical with his own, and to the carrying out of this principle doubtless much of the success which has been achieved by the firm is due. The departmental knowledge and long business experience of these gentlemen, their general unity of action, and their determination to carry out the precepts of the high-minded and honourable men by whom they were preceded, have kept this firm, through all the mutations of trade, in the same relatively high position which it held in the early years of the century, when the operations of commerce were on a much smaller scale than they are to-day.

The chief branch establishment carried on by Messrs. A. & S. Henry & Co. is at Bradford, where for nearly forty years their turnover in the woollen and worsted trades has been exceedingly great. The present palatial warehouse building in which the Bradford business is carried on may be justly regarded as one of the finest buildings of the kind in the kingdom, being vast in extent and of considerable architectural beauty. This house was started at the right time and with the right men. The worsted trade was just entering upon the most profitable stage of its development, and the gentlemen upon whom the task devolved of taking the full advantage of this circumstance were happily possessed of the requisite trade knowledge and the necessary ability and integrity to make the best of their opportunities. As we have seen, Mr. John Mitchell was for a lengthened period connected with the management of this branch, and after his going over to the Manchester house, the conduct of this important business chiefly devolved on Mr. Henry Mitchell, who, for a long time acted in conjunction with Mr. D. M. Douglas, who managed the home department, and Mr. T. S. Brailsford, who had charge of the continental business. Mr. Mitchell still continues to preside over the fortunes of the Bradford house. Mr. Douglas died in 1882, and since then Mr. Brailsford has retired from business. The Bradford partnership now consists solely of Mr. Henry Mitchell and Mr. Alfred E. Ruthwin. Mr. W. R. Haigh was also, until a few years ago, one of the partners in the firm; and at Bradford in the first instance, and subsequently as manager of the branch house at Huddersfield, assisted materially in adding success to the general undertaking. Mr. Moseley Williams, who was for many years connected with the Manchester house, has now the charge of the Huddersfield business. It may be as well to state, perhaps, at this point, that the name of Mitchell, which crops up so frequently in this partnership, does not imply relationship. Mr. Mitchell Henry is not related to Mr. Henry Mitchell, nor was he related to Mr. John Mitchell, nor were the two last-named gentlemen related to each other.

Mr. Henry Mitchell has long been one of the leading public men of Bradford. He first came to the town in 1841 as manager for Messrs. Wm. Fison & Co., the firm of which the Right. Hon. W. E. Forster was down to his death a member. Mr. Mitchell continued with Messrs. Fison & Co. until 1848, when he became buyer for Messrs. A.

& S. Henry & Co. His success in the latter capacity was such that when he had been four years in the firm's service he was made a partner. From that time (1852) to the present Mr. Henry Mitchell has devoted his energies to the commercial enterprise with which he thus became linked, bringing to the work an intimate acquaintance with all the details of the worsted trade, and an amount of business sagacity and energy which, combined with the ability and tact of his partners, served to place the Bradford house in the front rank of local merchant firms. At the time when Mr. Mitchell entered the service of Messrs. A. & S. Henry & Co. the population of Bradford was not more than 80,000 ; the town has now a population of about 200,000, and the trade of the district has increased in a corresponding ratio. Some idea of the part that the Bradford house of A. & S. Henry & Co. has played in this rapid development may be formed when it is stated that about 600,000 pieces of cloths and stuffs are purchased by this house in a single year. Taking the average length of these pieces as fifty yards, we get the large total of 30,000,000 yards, or over seventeen thousand miles' length of textile fabrics

—enough, one would think, to clothe a whole nation. That one establishment, and that only, after all, a branch concern, should be able to turn over such a large quantity of goods as is represented by these figures, is something to marvel at even in these days of gigantic dealings. What a formidable array of figures would be arrived at by the addition of purchase returns of the parent house and the other branch establishments is more than the imagination can grasp. During the early years of his partnership Mr. Henry Mitchell devoted himself with rare assiduity and success to the management of the business affairs entrusted to him; and as time went on, and his ability and high principles came to be known and recognised, he was urged to take upon himself the performance of those public duties which he was considered so well qualified to execute. In the year 1870 he was elected a member of the Bradford Town Council; and his services met with such approval that he was afterwards made Alderman, and in 1874-5 became Mayor of the town. During his term of office as chief magistrate Mr. Mitchell inaugurated many useful movements, and won the esteem of the inhabitants in a remarkable degree.

In trade matters Mr. Mitchell has always been looked upon as one of the chief local authorities, and the good work he has achieved as a member of the Bradford Chamber of Commerce, and in promoting the scheme for the establishment of a technical school in Bradford, have already yielded results which will be an enduring monument to his commercial zeal and foresight. Since 1877 Mr. Mitchell has been President of the Bradford Chamber of Commerce, and at the meetings of this important body his utterances on matters affecting the mercantile interests of the community have been invariably marked by a strong spirit of practical wisdom, and in many instances have sensibly aided the solution of difficult commercial problems. There is no project, perhaps, with which his name is more intimately associated than that of the establishment of the Bradford Technical School, of which he is president, and which has been largely assisted by his generosity. He has watched the rapid progress made in France and Germany in the manufacture of textile fabrics, and has noted the special attention these countries have given to the imparting of technical instruction. He has seen clearly enough that if England is to retain its supremacy in the production of worsted fabrics it is necessary that a higher and more systematic training should be adopted on the part of those whose lot it will be to carry the trade forward in the face of foreign competition; and he has set his heart on establishing in Bradford a technical school which shall be in advance rather than behind anything of the kind attempted abroad. He was mainly instrumental in sending a number of artisans connected with the various departments of the Bradford trade over to France in 1878, during the time of the Exhibition; and their reports on the collection of textile goods displayed in the great building on the Champ de Mars, and on the technical schools which they were enabled to inspect at Rheims and other places in France, have been amongst the most important of recent contributions to the literature of commerce. The result of the endeavours which have thus been made for the formation of a technical school in the metropolis of the worsted district is that a Technical College has been erected on a scale of completeness which throws into the shade any previous attempts made in this direction in the country.

The laying of the foundation-stone of this edifice, in June, 1880, was an event which created great interest, the Masters and Wardens of the Clothworkers' Company being present at the ceremony. The Clothworkers' Company recognised the importance of the institution by contributing the handsome sum of £3,000 to its building fund, as well as an annual sum, and founding several scholarships in connection with it and the Yorkshire College of Science. The Bradford Technical College was opened in June, 1882, by the Prince of Wales, when His Royal Highness and the Princess of Wales were entertained by Mr. Mitchell, and the event was celebrated by great public rejoicing. Since then the institution has held a prosperous course, and, with Mr. Mitchell still at its head, is providing Bradford with the highest technical instruction, which is being eagerly taken advantage of and cannot fail to promote the prosperity of the textile industries of the town and district in a very material degree. On the occasion of the Philadelphia Centennial Exhibition of 1876 Mr. Mitchell was appointed by the British Government English judge for woollen and silk goods, and the report he subsequently published on these fabrics was of great value. Mr. Mitchell was also appointed to the important post of vice-president of the jurors selected to adjudicate upon worsted yarns and fabrics at the Paris Exhibition of 1878. His report on the textiles and machinery in the Exhibition, published in pamphlet form, was received with much attention by the commercial world, and there is no doubt the practical suggestions and conclusions there laid down have already yielded useful results. Addressing himself particularly to the subject of technical education, he said: "France long ago recognised the necessity of providing special means of training for such of her citizens as desired to devote themselves to commercial pursuits, and this special technical training has begun to bear good fruits for them. In times not far gone by, we were, in knowledge of the processes of manufacture and in inventive ability, far in advance of any other country; but France, Germany, and America now run us very close, and in some particular matters of manipulation there is no doubt the French surpass us. Of course, our rivals have had the full benefit of English skill and English machinery to start with, and it is to their credit that since then they have tried to improve for themselves upon the advantages thus acquired, and have not been content to be mere imitators. This is what we must aim at also. We must not be content to be imitators either; we must create for ourselves. The cry for technical education, therefore, is no empty one—it represents a necessity; and there is nothing more encouraging, I take it, in the present aspect of the Bradford trade, than the support which is being given to the new Technical School, and the desire which is being evinced on the part of persons engaged in the local industries to avail themselves of the advantages thus afforded them." In educational matters generally, Mr. Mitchell has not been less energetic. He was a member of the first School Board elected for Bradford, is a Vice-President of the Bradford Mechanics' Institute, a magistrate for the borough of Bradford, and a Governor of the Bradford Grammar School. As a prominent member of the Wesleyan body in Bradford, Mr. Mitchell has also entered with much earnestness into the advancement of many leading philanthropic and religious movements, and as chairman of important public meetings his services are often in request. Mr.

Mitchell has likewise interested himself in political questions, and has more than once been desired to stand for Bradford in the Conservative interest. He was content, however, at the General Election of 1880, to accept the humbler position of chairman of Sir H. W. Ripley's committee, and went through the campaign without a disrespectful word being said against him by his opponents during all the heat and excitement of a fierce political contest. Later elections have found him still unwilling to allow himself to be nominated as a candidate, and still the chief champion of the gentlemen selected to fight the battle of his party. Mr. Mitchell commands the esteem of all classes of the community for his tried integrity, his public-spirited conduct, and his manly modesty. Many chances of higher public distinction are still open to him if he should care to take advantage of them.

Having thus briefly sketched the personal histories of some of the principal members of the firm of A. & S. Henry & Co., it will be interesting to describe something of the nature and extent of their business transactions. With that object in view, we will first glance into the interior of the Manchester establishment. The warehouse fronts into Portland Street and York Street; and since it was built, nearly fifty years ago, its external architectural importance has been dwarfed to a considerable degree by the erection of one or two neighbouring buildings of greater pretensions. Even yet, however, there is an internal vastness about the warehouse which will largely atone for the absence of external embellishment. Utility, not ornament, was the prevailing idea for business premises in 1836, and utility is stamped upon every wing and corner of this building; one may walk through room after room, and ascend floor upon floor, without coming upon a waste space anywhere. Now we walk through seemingly endless vistas of calicoes, walled in regular order and marked off in equal blocks, like the streets of an American city; now we plunge into the midst of a busy silent crowd of workers engaged in the arduous duties of packing; and now we turn into a room where we find ourselves surrounded by muslins, laces, curtains, and all descriptions of light and airy materials. Indeed, there is almost every variety of goods to be met with in this warehouse. Textile fabrics of course form the chief item in the daily business programme, but

A. & S. Henry & Co. by no means confine their operations to this class of goods. Dealing mainly with foreign countries, and with some remote lands far distant from direct European communication, they find themselves called upon to provide customers with materials and commodities not generally classed with Manchester goods. Nothing comes amiss to them in the way of an order. They have no more objection to supplying Panama hats for American planters, saddles for Brazilian horsemen, whips for Mexican mule-drivers, tin cans for Sandwich Islanders, earrings for natives of Central Africa, preserved meats for Siberian peasants, fishing-tackle for Canadian anglers, or hair-pins for the damsels of Patagonia, than to supplying simple calicoes or muslins for the ladies of Italy or Spain. There is scarcely a country with which England has dealings in either hemisphere that this Manchester establishment has not orders from at this present time. A peep into the room where a number of men are busy packing, directing, and despatching goods, will suffice to show what various parts of the world the firm has connection with. What a large number of bales are being made up for the interior of

South America! Many of these bales have to be conveyed hundreds of miles on the backs of mules, and in all these instances the instructions are to make each of the packages of a certain specified weight, for convenience of transport, the mules being protected by the authorities from being burdened with any heavier load. The fact that the packages are carried in pairs, one strapped to each side of the animal, has also to be borne in mind. For Australia the goods are packed in such a manner as to guard them effectively from being damaged by water. The voyage to the Antipodes is a long one, and the probabilities of the bales being brought into contact with water at one time or another have to be taken into account; consequently, in addition to the ordinary wrappings of tarpaulin, calico, sheeting, and what not, a complete coffin of tin is provided, and outside all that comes a wooden case, duly hooped and nailed. A huge bale of dyed prints is being got ready for Honolulu, to which place it will be shipped *viâ* San Francisco. For the United States and Canada the packing does not require to be so substantial, it only being a question of a few days between their being at Manchester and at New York, Philadelphia, or Quebec. Bales of prints are in course of packing for Vera Cruz, bales of coloured scarves for Demerara, bales of shirtings for Mazatlan, bales of shawls for the West Coast of Africa, bales of coloured stripes for Havannah, and bales of Arctic shirtings for Norway and Sweden. In some cases smaller packages than those intended for the backs of the mules have to be made up, the goods having to be carried over long interior journeys on the backs of fleet-footed Indians. Wagons belonging to the different railway companies are backed up in steady succession to the open doorways, and as the bales, boxes, and packages are hooped, "lagged," directed, and made ready for shipment, they are hurried on to the wagons, and probably within a comparatively few hours the whole mountainous pile will be dispersed amongst various outward-bound ships and on their way east, west, north and south to their respective destinations. The final process of pressing and packing is speedily done; the goods come down from the upper rooms by one or other of the elevators which are kept continually at work the day through, and are put into hydraulic presses, which squeeze and squeeze the cottons, stuffs, woollens, or whatever they may be, down to a half or a third or a quarter of their original bulk, and before they leave the presses they are fastened up and made secure against recovering their amplitude any more on this side of the world.

The basement floor is mainly set apart for the storing of grey calicoes, where thousands of pieces, the product of Lancashire looms, lie ready for shipment at the call of the firm's customers. At present it is not known whether the Sandwich Islands, or Cape Colony, or China, or, indeed, what place soever, will send for these goods; but the order for despatch will not be long in arriving from somewhere, depend upon it, for A. & S. Henry & Co. are not accustomed to keep large unsaleable stocks on hand.

The middle floors are divided into departments. There is a room given up entirely to velvets, where richness of colour and beauty of design meet the eye at every turn. The prevailing Pompadour style of design has pervaded this department; and its delicate tracery makes its way through all shades and colours of velvets. In another room we come upon wall on wall of cords—great heavy pieces, each measuring over a hundred yards in length, and worth at least £10. Then we find ourselves among piles of plain and printed moleskins; some got up in the style of fancy cloths, and which, we are told, are largely patronised by the American working man, though despised and rejected by his British brother, who prefers "the real thing," whatever it may cost him. In the shawl department we are confronted with all the hues of the rainbow, wrought out in fantastic designs upon materials intended to delight the eye of the coloured ladies of various tropical regions. One very wonderful specimen of a scarf is presented to our view. It contains no fewer than nine separate and distinct patterns, and is one of a large order in course of execution for the West Indies. The origin of this conglomeration of stripes, zigzags, squares, leaves, flowers, and diagonals was somewhat curious. In sending out patterns to distant parts, it is usual to forward a length of piece, upon which the patterns are wrought one after another in sections just sufficient to show each figure complete, the result being several yards' length of fabric divided up into panels, as it were, of varying breadth, according to the largeness of each pattern. This is much more convenient than sending separate patterns detached from each other; and as every section is numbered and priced, the customer at the other end has nothing to do in ordering goods but to quote one of the section numbers. In the case referred to, a length of nine patterns was sent out, and the customer wrote and ordered so many hundred dozens of the "pattern sent." This puzzled the Manchester people considerably, and they wrote back inquiring *which* pattern. The reply came, "The whole lot." And this was still more mystifying; for an order for sundry hundred dozens of each of the nine patterns was something so unusual—at all events with this particular customer—that Messrs. A. & S. Henry thought it well to write once again and enquire if they understood the matter aright. The next communication from the West Indian trader, fortunately, put the thing clear beyond all doubt: what was wanted was so many hundred dozens of scarves exactly similar to the pattern length; and so it came about that a variegated mixing of nine separate patterns in one scarf was accepted as answering a negress's notion of beauty and effect.

And in the particular region to which these goods are being sent from time to time, the pattern-length scarf is probably now considered the leading fashion. Many curious combinations of colour, which would be hurtful to the eyesight of a European lady, are here effected, and find favour in the eyes of the denizens of tropical climes. For the most part, the colours are bright and dazzling, reds and yellows carrying the palm ; but there is one intermingling of blue and green—colours which are not commonly considered to be in harmony—which is not only novel, but effective.

In another department we come upon a multitude of samples, arranged mostly in books, and including a marvellous variety of articles. We see samples of every description of hosiery, waterproofs, horse-cloths, sewing-cottons, pins, fishing-tackle, trimmings, gloves, laces, oilcloths, elastics and one knows not what. Boots, hats, wire mattresses, sail-cloths, bed-ticking, vestings, cotton suits, blinds, drills, and a thousand other useful objects come within the scope of this department. There are also departments for coloured checks and stripes, for printed calicoes, for cretonnes, for white shirtings, men's-wear goods, linens, and so on. It is, indeed, an entertaining day's work to make the tour of all these various rooms; and when, in the end, you are admitted within the counting-house sanctum, and see a large square room with row upon row of desks, and some thirty or forty clerks busily engaged in making out invoices, writing out orders, inditing letters, and entering items in ponderous ledgers — ledgers labelled "Brazil," "China," "Japan," "Mexico," "Australia," "Canada," "West Indies," and so on —you are doubly impressed by the magnitude and variety of the operations carried on in this one concern.

Much more might be said descriptive of Messrs. A. & S. Henry & Co.'s Manchester warehouse; but as it is necessary that we should give some idea of the appearance of things in the Bradford house as well, we may give our attention to the latter "straight away," as the Americans would say.

The Bradford establishment is a massive and substantial stone building in the Italian style of architecture, possessing an extensive frontage, and being six storeys in height. It is, for a warehouse building, one of the finest and most imposing erections in the country.

The ground floor of this warehouse is divided into large rooms, one series of which is devoted to the receipt of purchased goods from manufacturers and dyers, and the other series to the final despatching of the goods to their destinations. In what is called the grey-room, pieces are continually being received from the makers, just as they have come from the looms. As they come in, they are duly entered and checked, and, all being found correct, are despatched to the dyers without delay to be dyed. Carts from the various dyers are hourly in attendance, receiving or delivering pieces. Some dyers have a reputation as dyers of "blacks," others as dyers of special colours; and the grey goods are sent to firms according to their several abilities. When the goods come back "dyed and finished," they are immediately despatched to the higher regions of the warehouse, and allotted to their proper departments. It is, of course, known from the first which department has bought the goods. The business of the house is carried on in three separate sections—the A division, the B division, and the C division. The A division takes in the whole of the American trade, B the home trade, and C the Continental.

In the period of half a year, as many probably as thirteen thousand lots of goods will be received in each of these departments.

As the pieces come in from the dyers they are conveyed by hoists to the making-up rooms on the upper floors. To begin with, each piece is examined by one of the "overlookers," whose eye is quick to detect any error of shade or "bad place." Defective pieces are thrown out and the manufacturer or dyer, as the case may be, is communicated with regarding them, and the damaged goods have to be taken back or allowed for. Sometimes it is difficult to make out whether a particular defect is the fault of the manufacturer or the dyer, and in this dilemma the merchant leaves them to settle the matter between them. All being correct, however, the pieces are submitted to the operation of measuring. This is not done by means of the yard-stick, as the uninitiated might suppose, but by machinery worked by steam. The measuring-machine consists of sundry wheels which set a beam rapidly revolving, carrying with it a piece over a series of tables and rollers marked off into yards. In a few seconds the piece is carried through its whole length, and the youth who "minds" the machine writes in chalk on the piece the correct number of yards. The pieces, although they are always ordered of certain lengths, vary to some little extent, and all these variations have to be taken into account in settling with the manufacturer. There are also a number of machines which measure and roll the pieces at the same time. These are called "clock" machines, from the fact that they measure by means of an indicator.

After the pieces have been measured, they are sent to be rolled, and here again special machinery comes into play. A board, the width of the piece, is placed in the grooves of the machine, and as soon as the end of the fabric has been attached to the board the machine is set revolving, and in a very short space of time the piece is taken out, and neatly and smoothly wrapped in the form in which pieces are seen in the drapers' shops. The work of making and supplying piece-boards is, in itself, an extensive local trade, and in this warehouse there are thousands of such boards piled up in immense stacks. For some materials and some markets inch boards are required; for others, half-inch or quarter-inch; and some customers have a partiality for certain colours of paper as coverings for the bevelled edges of the boards. Blue edgings are mostly used, green comes next, and some consumers demand yellow or white edgings. When the pieces have been rolled, they are entrusted to the hands of the persons whose duty it is to affix shields, bands, and tickets to them, and it is surprising what an amount of artistic talent and ingenuity is exercised on behalf of this department. The designing of shields and labels for pieces is an important branch of industry; and few more showy or elegant art scrap-books could be got together than is to be seen in the large folio volume in which Messrs. A. & S. Henry & Co. keep their specimen shields, most of them being in actual use by customers, the rest being there for customers to make selections from. For South America and the Indies, the designs are of the most fiery description; for the United States, star and stripes and eagles predominate; and for the Continent and the Home trade, artistic ideas more than patriotic sentiment find vent. Some customers favour shields with portraits of celebrities depicted on them; others prefer floral designs; others again do not think their goods sufficiently attractive unless graced with portraits of national beauties. The quaint device of the three black crows is appropriately worked up for a certain customer's black goods; and one buyer of Italian cloths thinks it most fitting to show on his shield the emblems of his calling; so the artist has grouped thereon the shears, and all the other best known implements of the tailor's trade. The "Peabody Brand" is a proof of another customer's appreciation of philanthropy; and the go-ahead spirit is abundantly symbolised in pictures of railway trains, steamers, balloons, telegraph-wires and so forth. Royalty naturally comes in for a large share of this pictorial display, the Princess of Wales, perhaps, outstripping all her rivals on this ground. Mottoes are also much affected, Latin and French ones showing scholarship, and terse English proverbs, breathing forth honesty, fair-dealing, and good-will, serving to express the sentiments supposed to be entertained by the vendors towards the purchasers. The shields, tickets, and bands having been duly affixed, the pieces are now wrapped in paper or glazed calico, and are ready to be sent out to customers.

The kind of goods thus disposed of are chiefly what are known as stuffs, being produced in the Bradford trade. There is still the woollen department, however, that we ought to take note of. In this section of Messrs. A. & S. Henry & Co.'s business a great change has been introduced during the last few years, since worsted cloths came so largely into fashion. Woollens of the old substantial sort have been largely superseded by these lighter, and, perhaps, more elegant materials, and this firm have done much to develop this branch of business. In their large worsted coating-room there are hundreds of pieces lying ready for despatching; and the manager of the department possesses a complete record of the history of each piece from the time of its quitting the manufacturer's looms, through every stage of dyeing, finishing, and making-up, until it leaves the warehouse as sold.

The introduction of this branch of business has proved of enormous advantage to Bradford. It continues to grow and develop year by year, and is now one of the most important features of the local trade. The exports of worsted coatings to America alone, amount to nearly £700,000 a year; and the total annual value of the production of this class of goods in Bradford cannot now be less than £3,000,000.

The Bradford firm have also recently opened a French department for the sale of all wool goods, with the view of stimulating local effort in competition with the productions of the French manufacturers, who have all along held the chief position in this particular trade. The demand for Bradford all-wool fabrics, however, increases every year, and the time is probably not far distant when Bradford makers will be as successful in the production of these goods as their foreign rivals. In mixed fabrics and cloth for men's wear, the Bradford looms, however, cannot be beaten.

There are several other special departments, which we must dismiss by simply mentioning. There is the department devoted to the home fancy trade, where everything is sold by samples, each of which samples, it may be stated, is invariably cut out of the centre of the piece whose class it is to represent. Ladies' cloakings and costume cloths form a considerable item in the business of this department. Then there is the black department, the title of which sufficiently describes it. The most astonishing thing that the outsider observes in this division is the multitude of shades of black that there are. In the room set apart for winceys we meet with signs of a very active trade. Something special in the way of book-making is to be found in the sample room. It is here that all samples are made up into books, according to qualities and colours, and much tasteful work is turned out of this department. There is likewise an index or reference-room, wherein are registered samples of every customer's purchases, a strip from each piece that has been sold being retained for three years, so that if any dispute or misunderstanding should arise, the firm have here the means of referring to a tangible record of all business transacted. The greatest use of these sample collections, however, is in their enabling customers by simple reference to a past dealing to repeat any order, or portion of an order, within three years.

The offices and selling-rooms of the establishment occupy the greater portion of the first-floor. It is in these rooms that the buyers and sellers meet for the transaction of business, and where the heads of the house are located. The firm employ but few travellers, their dealings both at home and abroad being mostly with wholesale traders. At the beginning, the Bradford house, like the Manchester establishment, had almost exclusively an American connection; but it rapidly developed, until now it carries on one of the largest home and foreign businesses in the North of England. The amount of correspondence with other countries which is here daily going on is necessarily very large. Every post brings shoals of letters, every hour brings fresh telegrams. It is interesting to inspect a number of cablegrams (as they call them) from America. All telegraphic communication between the firm on this side and their customers or agents in the United States is conducted by cipher. Two word of such contrary sense as "Kangaroo andante" may mean to Messrs. A. & S. Henry & Co., "Send three hundred pieces of three-quarter Italians," or "If at thirteen and sixpence send two bales," as the case may be. By the system thus established, communications running, when translated, to the extent of ninety or a hundred words may be compressed into four or five.

The counting-house, with its little army of clerks, is also on the first-floor, as is also the dining-room, kitchens, &c. Indeed, into whatsoever department one searches, one finds everything on a scale corresponding to the magnitude of the business.

The firm of A. & S. Henry & Co. will always be remembered for the important part it has played in opening up that vast American trade which, for so many years, was one of the main elements of support to the manufacturing industries of this country.

THE CROSSLEYS OF HALIFAX.

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DR. WHITAKER, in his "Loidis and Elmete," published in 1816, took occasion to express his regret that Halifax had "declined into manufactures." More than that, the people engaged in the new industries—which, despite all that the reverend antiquary said, were drawing wealth and population to the town—did not find favour in his eyes, for he makes the remark that the stranger going amongst them "was shocked by a tone of defiance in every voice, and an air of fierceness in every countenance." Doubtless, the rush and hurry of business, now that steam was the ruling power and machinery was replacing manual labour on all sides, would be somewhat disconcerting to the learned recluse, who lived in the past rather than in the present; and the manners and customs of a community just beginning to throw off the yoke of menial servitude and feel the delights of independence would perhaps be too self-assertive for his comfort. But the new force which had been set at work in Halifax was destined to make its impress upon the history of the town in a degree far more marked than all the chapters of incidents and accidents, murders and romance, upon which Dr. Whitaker loved so much to dwell. Interesting it was, no doubt, to recall the time when the site of the parish church (a building which itself dates back to the twelfth century) was a hermitage embosomed in woods, to which pilgrims from distant parts came to tender their devotion; interesting to think of the days when the great hills which rise on either side of the Halifax valley were a bleak, sterile wilderness, into which the herdsman and his flocks did not dare to enter; interesting to remember the time when the Flemish weavers, expelled from their native country by persecution, took refuge in the district in the reign of Edward III., introducing not only their handicraft but something of their speech, as is supposed to be evidenced by the once popular distich,

"Gooid brade, botter, and sheese,
Is gooid Halifax, and gooid Friese;"

interesting to tell of the Halifax gibbet, the forerunner of the guillotine, by which offenders guilty of stealing any commodity of the value of thirteenpence halfpenny during the period extending from 1541 to 1650 were decapitated; interesting to remember that Dr. Tillotson, Archbishop of Canterbury, had been born in the parish, and that Daniel Defoe wrote his "Robinson Crusoe" in Halifax, while hiding there to escape punishment for his onslaughts on political enemies; all these things were a pleasure and a joy to the heart of the historian; but he looked with horror and dismay upon the change which was being wrought in the aspect of the hills and valleys where industrial enterprise had settled itself, where the solitudes were becoming peopled by a race of workers very different from the labourers of the fields and gardens, and where there seemed to be an awakening into new life which threatened the complete obliteration of all things pastoral, and slow, and ancient.

At the time when Dr. Whitaker vented his wrath upon the "new men" of Halifax, two names which later on were to exercise a potent influence in the life and work of the district had already begun to be familiar in commercial circles. These were the Crossleys and the Akroyds. The latter were engaged in the worsted trade; the former were manufacturers of carpets. Both firms rose to great eminence. Together, they probably contributed more than all other local enterprises combined to make Halifax the prosperous town it is to-day, and their histories form remarkable chapters in the story of England's industrial progress. It is, however, with the Crossleys only that we propose to deal in the present article.

The founder of the firm was John Crossley, a member of an old Yorkshire family which had long been settled in the locality. John Crossley learned the business of carpet-weaving with an uncle, and afterwards took the management of a small carpet-manufacturing establishment carried on by Mr. Job Lees, in Lower George Yard, Halifax. He seems to have owed much of the good fortune which afterwards fell to him to the kindly help and wise counsel he received from his wife, who was the daughter of a neighbouring farmer named Abraham Turner. Martha Turner was one of those homely Yorkshire maidens whose presence is a brightness, whose influence is a charm. Dr. Smiles has deemed this excellent Yorkshire woman worthy of a place amongst his examples of the force of thrift. He tells us that Martha, when about fifteen years old, went as a servant to a Miss Oldfield, at Warley. "In that service, in her own person, she did the work of kitchen-maid, housemaid, and cook, and in addition to that, she milked four or five cows night and morning. She remained about ten years with Miss Oldfield. Her wages were at first fifteen-pence a week; after two years, they were increased to eighteen-pence; and after nine years' service, they were increased to six guineas a year. Yet during that time Martha Turner saved thirty pounds by sheer thrift." It is then related how Martha made the acquaintance of her future husband. In the Manuscript Memoir of her life she thus told the story of their courtship: "When I went to the gate one evening there was a young man standing there, who asked me if I wanted a sweetheart. I answered, 'Not I, marry! I want no sweethearts.' I then went into the house and left him. saw the same young man frequently about, but did not speak to him for years after. His name was John Crossley. When my mistress ascertained his object she did all she could to set me against him. She told me that when she was a girl she had gone to a boarding-school kept by a Mrs. Crossley—that her husband's name was Tom Crossley, the grandfather of this very man that was courting me—and that a wilder, idler scapegrace she never knew. She always said, when she saw him coming, 'There's young Crossley come again.' One day I received a love-letter from him, which I could now repeat word for word. I had several other suitors, but none were so persevering as John Crossley. He pressed me very much to have him. At last he sent me a letter to say that a house was vacant in Lower George Yard, close to the works he was managing, and that it was a great chance to meet with one so convenient. I told him that I was going home to spend the 5th of November, and would pass that way and look at the house, which I did. When I got home I asked my parents for their consent. They did not object to it much at the time; but I had not been at Miss Oldfield's more than a day or two before they sent over my sister Grace to say that they would not give their consent to the match, and that if I insisted on being married to John Crossley they would never look me in the face again. So soon as my sister was gone I retired in a most distressed state of feeling to my bed-room, and opened my book that was the preparation for the sacrament, and the first place at which I opened I read these words: 'When thy father and thy mother forsake thee, then the Lord will take thee up.' This comforted me very much. I felt that the Lord was with me in this matter and I could no longer doubt which was the path of duty, * * * I decided to accept John Crossley's offer and we were married on the 28th day of January, 1800." Dr. Smiles adds, "Mr. Crossley never did a better day's work than in marrying his excellent and noble wife. From that day forward, she was his helper, his co-worker, his consoler. She assisted her husband in all his struggles, and, in a certain sense, she was the backbone of the Crossley family."

For a time John Crossley and his wife continued to reside in the little house in Lower George Yard, and very happy and comfortable they were there. Mr. Crossley retained his position as manager of the carpet works of Mr. Job Lees, until that gentleman's death, when Mr. Crossley and a couple of friends united their resources and bought the plant, carrying on the business in partnership for a while. Differences presently arose between them, however, and John Crossley entered into partnership relations with his brother Thomas and Mr. James Travers. They took Dean Clough Mill, then a very small place, on lease, and there carried on the business of worsted spinning chiefly. "At the same time," to quote again from "Thrift," "John Crossley continued to spin and dye the yarns and to manage the looms of the firm which he had left. In fact, the dyeing and spinning for the old firm formed a considerable part of the business of the new one. Then came a crisis. The old firm took away their work: they sent the wool to be spun and the yarn to be dyed elsewhere. This was a great blow; but eventually it was got over by extra diligence, energy, and thrift—Mrs. Crossley herself taking a full share in the labours and responsibility of her husband." The nature of their undertaking at this time, and the manner in which they worked it, will be best gathered from Mrs. Crossley's own words. "In addition to the carpet-making," she says, " we carried on the manufacture of shalloons and plainbacks, the whole of which I managed myself, so far as putting out the warps and weft and taking in from the weavers. We had at one time as many as a hundred and sixty hand weavers on these goods. We sold the principal part of them in London. We had also about four looms making brace webs and body belts. The produce of these looms I sold principally to the Irish, who made them up into braces and hawked them about the country. I also made and stitched, with assistance, all the carpets that we sold retail. I used to get up to work by four o'clock in the morning, and being very diligent, I have usually earned two shillings before breakfast, by the time that my neighbours were coming downstairs."

At this period the carpet trade could hardly be said to have become firmly established in the West Riding; it was only carried on here and there in a small way, for as yet the demand for carpets was by no means universal. They were the luxury of the rich, and years had to elapse before, by the well-directed exertions of such men as John Crossley, they could be produced at a cheap enough rate to admit of their being introduced into the homes of the poor. Carpets and civilization may be considered to have advanced together. There was a time when the floors of the royal palace were strewn with rushes, in which were only half-hidden the odds and ends that were thrown from the table, mingled with the mire that was brought in by ill-shod feet from the unpaved roads. The rush-strewer was an important official of the royal household, and the rush-bearings which are still familiar festivals in the country places are but the remnant of the ancient usage connected with the days of rush-strewn floors. It is mentioned as a special feature of the luxurious style of living adopted by Thomas à Becket that his dining-room floor was daily covered with straw or hay in winter, and with green branches in summer, that the guests for whom there was not room at the board might sit on the floor without fear of soiling their clothes. Then came the first rude carpets of plaited rushes, after which the era of carpets was not long in following. In the east these accompaniments of luxury were used for centuries before they found their way to the cold northern latitudes where they were capable of being better appreciated.

From China and India they were carried forward to Egypt, and spread "beneath the ivory feet of purple-cushioned couches," as Plautus tells us; from Babylon to Greece, from Greece to Rome, the history of the carpet may be traced. The Moors took them into Spain, and being seen there by the Venetians, their introduction into Italy, and thence westward to England, was soon afterwards an accomplished fact. It was not until the Edict of Nantes sent to our shores large bodies of weavers, in 1685, that the manufacture of carpets came to be one of the recognised industries of the country; and to the fact that many of the foreign refugees settled in the Halifax district we owe the setting up in the carpet-making business of Mr. John Crossley, although there is little doubt such strong individuality, talent, and diligence as he possessed would have forced him to the front in some other direction if the carpet-trade had not been there for him to take up. He and his admirable wife stuck well to their work at Dean Clough, and the place prospered in their hands, although the struggle for success was a harder matter in those days than it is even now. The partnership between Mr. Crossley, his brother, and Mr. Travers lasted twenty years, and at the end of that time they found they had £4,200 to share between them—fourteen hundred pounds each—so they dissolved the connection amicably, and John Crossley kept on the business thenceforth in his own name, until his sons John, Joseph, and Francis were old enough to be brought into the firm, from which time the undertaking was carried on under the style of John Crossley and Sons, the title which the firm still bears.

In a speech delivered by one of these sons, Sir Francis Crossley, on the occasion of the opening of the People's Park at Halifax, the references made to the founder of the firm and his wife (the parents of the speaker) were of a most interesting character. Speaking of the time when his mother, Martha Crossley, used to go to her daily work at the mill at Dean Clough, he said, "As she was going down the yard at four o'clock one morning, she made this vow, 'If the Lord does bless us at this place, the poor shall taste of it.' It is to this vow, given with so much faithfulness, and kept with so much fidelity, that I attribute the great success which my father had in business. My mother was always looking how she could best keep this vow. In the days that are gone by when it was a dreary thing to give employment to a large number of people, the advice that she gave to her sons was, 'Do not sell your goods for less than they cost, for it would ruin you without permanently benefiting anyone; but if you can go on giving employment during the winter, do so, for it is a bad thing for a working man to go home and hear his children cry for bread, when he has none to give them.'"

Trade prospered with John Crossley and Sons, and when in 1837 John Crossley died, he had the satisfaction of seeing the business which he and his wife had established in a flourishing and prosperous condition, his sons well accustomed to all the details of the business, and full of energy and capacity, and his name held in honour and esteem by his fellow townspeople. His family consisted of eight children; his wife survived him, and not only saw the Dean Clough Mill become the property of her sons, who purchased it from Messrs. Waterhouse, but lived to see great extensions made, and the business increased to proportions which to her would seem enormous, small even as that would be to the gigantic concern which it subsequently be came. Mrs. Crossley lived to the age of eighty. "She lived to see her children's children's children," said her son, "and one of the greatest treats she had in her old age was to fix a mirror in her room so that while lying in bed she could see the happy countenances of those who were going to work or coming back again."

After the death of John Crossley, the founder of the firm of John Crossley and Sons, the responsibilities of management devolved upon the three sons, John, Joseph and Francis, and they worked together with so much agreement and harmony of purpose, that they succeeded in building up a business the operations of which extended to all parts of the globe, a business which ultimately grew to be one of the first magnitude amongst the commercial enterprises of the kingdom. It would be difficult, perhaps, to say what particular portion of this success was contributed by each of the three brothers; each filled the place he was best fitted for in the management of the concern, and when "enterprises of great pith and moment" had to be entered upon, it was the united force of the three that carried them to the point of execution. It has been said, however, that to

Francis, the younger of the three sons, the honour is to be awarded of being the projector and creator of new schemes and ventures, and that to his sagacity and determination many of the chief successes achieved by the firm were due. At the time John Crossley's three sons took their place in the works at Dean Clough, the transition from the hand-loom to the power-loom was being completed in the cotton and worsted trades, and they looked forward to the time when the same agency should be brought to bear upon the carpet trade, although the difficulties in the way were very great. To many it seemed impossible that steam-driven machinery could ever cope with the ponderous operations of carpet-weaving, but, little by little the energetic action of the Crossleys, aided by the inventive skill which they had the good sense to employ, ultimately succeeded in bringing about the desired result. Francis Crossley had watched the course of the power loom with jealous interest, and after seeing it applied with success to the linen manufacture at Barnsley by Mr. George Collier for Messrs. Thomas Taylor and Sons of that town, he felt more than ever inclined to try the experiment in his own trade. In the spring of 1850, he invited Mr. Collier over to Halifax to see him, and then put the question to the inventor, whether he did not think he could accomplish as much for the carpet as he had done for the linen manufacture. It was admitted that the conditions were less favourable, but an inventor never despairs of being able to work out any mechanical problem in which there lurks the remotest chance of success, so Mr. Collier undertook to do his best to meet Mr. Crossley's wishes. Failure had theretofore attended all efforts that had been made by other inventors in this direction. Mr. John Hill of Manchester, and Mr. Wood of Pontefract, both claimed to have mastered the difficulty, and had taken patents out for power-looms for weaving carpets, but their inventions would not stand the test of practical application. Messrs. Crossley had themselves expended large sums of money in the purchase of patent rights, and had had a number of looms constructed according to Hill's models, but after being tried for a few months they had to be abandoned. The prospect was therefore not altogether rosy when Mr. Collier came upon the scene; but he set himself to his task with a good heart, and not very long afterwards paid a second visit to Mr. Francis Crossley at Dean Clough, bringing with him this time a model of a loom the special feature whereof was what was called a "wire motion." The junior partner made a careful examination of the model, and at once perceived that it was a decided advance upon the inventions of Hill and Wood; the result was that before Mr. Collier returned to Barnsley he was engaged to take up a profitable position in the works at Dean Clough, for the express purpose of perfecting a power-loom for the weaving of tapestry and Brussels carpets. Then followed a most anxious period both for the inventor and Messrs. Crossley. Mr. Collier's model was as yet but an idea; when he came to try to work it out, obstacle after obstacle presented itself, and there were times when the attainment of success seemed impossible. But if the inventor sometimes lost faith in himself, Francis Crossley never withdrew from him his full belief and confidence, and this it was, more than all else, that supported Collier in his patient efforts to conquer his task. Much money was spent by the firm in carrying out the various experiments proposed by him from time to time — experiments which only too often carried them no nearer to the goal at which they aimed—but, through all, his employers gave him hope and encouragement, and in the end the reward came for this long and harassing toil, this expenditure of money and skill, this waiting and hoping, and the inventor constructed a carpet power-loom which successfully passed the ordeal and proved a commercial triumph. All other carpet looms were now superseded, and Collier's patent took its place amongst the most remarkable inventions of the age. Messrs. Crossley and Sons lost no time in taking full advantage of the new machine, and the walls of the Dean Clough Mills were soon echoing the sound of scores of looms of which steam was the motive power. It was a complete revolution. The capacity of production was increased twelve or fourteen-fold at a stroke, and the cost of manufacture reduced in a corresponding ratio. For all that, Mr. Collier was not satisfied with his carpet-loom, but worked away at it, adding improvement after improvement, taking out patent upon patent, until he had more than accomplished the task he had set himself. A patent was taken out by him on the last day of the year 1851 for a new loom for weaving velvets as well as carpets, including several valuable improvements communicated by Mr. E. B. Bigelow, an American inventor. Messrs. John Crossley & Sons thus became the proprietors of a series of patent rights which were of great value, and for many years yielded them an immense revenue. Every carpet manufacturer in the kingdom found it necessary to adopt Mr. Collier's loom and discard the old hand-loom, or give up the competition in disgust, so that for a time the Crossleys enjoyed a practical monopoly of the trade. The fortunes of the Crossleys were now made; they leaped, almost at a bound, from a position of moderate success, to one of unbounded prosperity; wealth poured in upon them at an almost unparalleled rate, and their patents and goods found their way into all the markets of the world. The pace that was now demanded of them was something marvellous; but they proved themselves equal to it. They extended their works at an amazing rate, and in every department of their operations provided themselves with the best skill that could be procured. In his own province, Mr. Collier was, of course, supreme; but he had the good fortune to find in John Marsden (an undoubted mechanical genius) and Charles Barraclough, two able, if comparatively unknown, coadjutors in the working out of his inventions and adaptations.

Messrs. John Crossley and Sons became possessed of unequalled facilities of production, and they resolved that they would remain unequalled also in the quality of their goods. One of the maxims inculcated by the originator of the business was, "Let each carpet be its own traveller." Up to this principle his sons always acted, and year by year succeeded in turning out carpets of more dazzling beauty, more elegant design, and more attractiveness of colour than the carpets which had previously held the market. To this end much artistic talent was employed in the evolvement of designs, the business being conducted throughout with an amount of energy that put the efforts of their competitors into the shade. And so the firm rose to wealth and fame, and the three sons of John Crossley acquired distinction both as princes of industry and as public citizens. It will be an interesting study to trace the more prominent incidents of their several careers; and with this object we will begin with an outline of the life of Francis, the youngest son, whose good fortune it was to touch a point of social success which perhaps brought him into greater notice than his brothers.

Francis Crossley devoted his remarkable energies almost exclusively to the promotion of his business advancement, until the year 1852, when the Liberals of Halifax prevailed upon him to come forward as their candidate, and he was returned to Parliament. In politics, like the rest of his family, he was a somewhat pronounced Liberal, and advocated views of reform which at that time were considered to be extreme. He was, however, as courageous in these matters as in others, and did not choose to trim his political sails to catch the varying wind of popular favour, but stuck manfully to his Radical programme, which he had settled according to his convictions, and left the rest to time and fate. In the House of Commons he was faithful and conscientious in the discharge of his duties, and both by speech and vote rendered valuable assistance to what he considered to be the popular cause. He sat for his native town until 1859, when he was asked to contest the West Riding. It was with some misgiving that his friends watched the progress of the campaign which he then undertook in conjunction with Sir John Ramsden. Mr. James Stuart Wortley was the Conservative candidate, and, with his powerful family influence, was looked upon as a formidable opponent. The result, however, showed that Mr. Crossley had been justified in the step he had taken, for he was returned, and from that time to the passing of Mr. Disraeli's Reform Bill continued to represent the Riding, and after that until his death, sat, with the late Lord Frederick Cavendish, for the Northern Division of the Riding.

After his fortune had been established, Francis Crossley proved the nobility of his character by a series of munificent benefactions which have left their impress for all time. First of all, he enriched the charities of the town in which he had made his wealth, and in many notable ways gave of his means in order to advance the comfort of the poor. In 1855 he gave to the inhabitants of Halifax a park, twelve acres and a half in extent, called the People's Park. This was done at a cost of £35,000; and he subsequently gave to the Corporation a sum of £6,300 to be invested for its maintenance. He has himself related how during a sojourn in the United States in 1855, the thought of making this gift first occurred to him. He said—it was at the time of the opening of the park—"What I am about to say now is what I have not told my dearest friend, not even the fair partner of my life, but when she reads the report of what I am about to say, she will remember that on the occasion when I returned from the walk I am about to relate, I asked her where those words were to be found in the Bible, 'The rich and the poor meet together, and the Lord is the maker of them all.' On the 10th of September, 1855, I left Quebec early in the morning for the White Mountains of the United States. I remember passing through some of the most glorious scenery on that day which I ever saw in my life; and, indeed, more beautiful I believe than steam and power have brought us within sight of. I stood inside the cars, from which I could see the tops of the mountains covered with all-glorious beauty. * * * I remember that when we arrived at the hotel at White Mountains, the ladies sat down to a cup of tea, but I preferred to take a walk alone. It was a beautiful spot. The sun was just then reclining his head behind Mount

Washington, with all that glorious drapery of an American sunset which we know nothing of in this country. I felt that I should like to be walking with my God on the earth. I said, 'What shall I render to my Lord for all his benefits to me?' I was led further to repeat that question which Paul asked under other circumstances—'Lord, what wilt thou have me to do?' The answer came immediately. It was this: "It is true thou can'st not bring the many thousands thou hast left in thy native country to see this beautiful scenery; but thou can'st take this to them. It is possible so to arrange art and nature that they shall be within the walk of every working-man in Halifax; that he shall go to take his stroll there after he has done his hard day's toil, and be able to get home again without being tired.' Well, that seemed to be a glorious thought! I retired home. My prayer that night was that in the morning I might be satisfied when I awoke that if it was only a mere thought that was fluttering across my brain it might be gone, but that if there was reality about it there might be no doubt about it, and I might carry it into execution. I slept soundly that night and when

I awoke my impression was confirmed. On the 10th of September, when I went to the White Mountains, I had no more idea of making a park than any one here of building a city. On the very day I returned I felt as convinced I should carry it out as I was of my own existence, and never from that day to this have I hesitated for a moment. Whenever difficulties arose I knew they might be overcome, and would be overcome. It is a happy day for me, that I am permitted to see that result." It was by acts like these, and speeches like these, so full of homely sentiment and good-feeling, and so instinct with religious thought, that Francis Crossley endeared himself to the people amongst whom he lived Whatever honour or distinction fell to him he still regarded himself as a man of the people, and sought not to plant himself on a different level. On the very occasion to which we have referred he strove to impress this feeling upon his hearers. "Had I been of noble birth," he said, "or traced my origin to those who came in with William the Conqueror, however true it might be, it would not have been good, it would even be boastful to have done so. But since I am of humble birth, perhaps it will be allowed to me to say a little of those who ought to share the honour which is heaped upon me," and he went on to refer to the early history of his mother and father, speaking, with a filial devotion that touched all hearts, of their many noble qualities.

Not long afterwards a statue of the donor of the park was erected by public subscription, and placed in the park "as a tribute of gratitude and respect to one whose public benefactions and private virtues deserve to be remembered." The statue is a noble work of art, and was executed by Mr. Durham, the well-known sculptor.

In 1855 Francis Crossley erected and endowed twenty-two almshouses near his own residence in Halifax, "in testimony of his gratitude to Almighty God, and with the view of benefiting those of his fellow-townsmen and others who may be in need of the assistance hereby provided for them." The endowment provides an allowance to each male inmate of 8s. 6d. a week, and to each female inmate 6s.

A baronetcy was conferred upon him in 1863, in acknowledgment of his commercial and public services; the distinction was well deserved and was borne without ostentation. He continued to perform his parliamentary duties zealously, and in all public movements of a philanthropic nature was always to be relied upon for help. In 1869, Sir Francis started on a proposed journey to the Holy Land and Egypt, but was overtaken by illness and did not proceed beyond Rome. He shortly returned to England and went for rest and quiet to his residence in Suffolk, Somerleyton, where his health improved somewhat, but he never completely recovered, although he was able to pay some slight attention to his business and public affairs for a time. Towards the close of 1871 he grew much worse, and on the 5th of January, 1872, breathed his last at his residence, Belle Vue, Halifax. Never was citizen more deeply regretted. He was accorded a public funeral, which was one of the most impressive ceremonies of the kind ever witnessed in Yorkshire. Lady Crossley survived him, and also his only child, the present Sir Savile Brinton Crossley, Bart., who was born in 1857, and resides chiefly at Somerleyton. Sir Savile Crossley, who is now M.P. for the Lowestoft division of Suffolk, has a considerable interest in the Dean Clough business, but takes no active part in the management.

Amongst the benefactions by Sir Francis Crossley we ought not to omit to mention a donation of £10,000, in 1870, to the London Missionary Society, and a gift of a like sum for establishing a fund for aged ministers and ministers' widows belonging to the Congregationalists.

Sir Francis Crossley was a man of indomitable energy and great force of character, a man of strict integrity and of unbounded charity; his business life was, for a quarter of a century, an unceasing toil, early and late, and though the reward he won was undoubtedly great, the strain thus put upon his constitution had the effect of impairing his health, and he died at the age of 54, in the height of his fame and prosperity. His good deeds, however, live after him, and for all time to come his name will be regarded with veneration and affection by the people of Halifax for whom he and his brothers did so much.

John Crossley was the eldest of the three brothers. One who knew him intimately—the Rev. Dr. Mellor—has said of him, that he was "a plain man, simple as a child, artless, unambitious of name or honours, content to do good and to be hidden behind the good he did, and to die where his work was done, if not forgotten, at least without the incense of human adulation." He had not the strong will and determination of purpose which gave to his brothers Francis and Joseph a powerfully marked individuality, but was from first to last a Christian gentleman and a philanthropist, who seemed to live for others more than for himself. Amongst the religious community whose doctrines he held—the Congregationalists—he was an untiring worker, and as a deacon of Square Chapel, Halifax, was an earnest, generous-hearted helper. He placed himself amongst the poorest members of the church, an equal among equals, paying the most courteous deference to the opinion of the humblest of the flock, leaving his own judgment to pass for its own weight and worth, and ready to help forward any plan of church work which the majority might see good to adopt. As a philanthropist he was found side by side with such men as the late Sir Titus Salt and Mr. Samuel Morley, his gifts to the cause of religion and education being of the most munificent character. It was far from being his desire to be placed in any prominent position before the public, still, his connection with the eminent firm of John Crossley and Sons, and his vast wealth, constituted such a claim to distinction in the eyes of his townspeople that they were unwilling to allow him to pass his life in the retirement which would have been most congenial to him. Accordingly, he was asked to take part in the work of the Town Council on the incorporation of Halifax as a borough in 1848, and consented. In the following year he was elected Mayor, and filled the office for two years. From 1848 to 1868 he continued to be a member of the Council, and in 1861 and 1862 again occupied the office of chief magistrate. During the last year of his mayoralty he had the honour of entertaining the Prince of Wales as his guest, on the occasion of his Royal Highness visiting the town for the purpose of opening the Town Hall, when Mr. Crossley's splendid hospitality won for him universal admiration. He also served the town for some years as a member of its School Board. A yet higher honour awaited him in 1874, when, on the retirement of Mr. Edward Akroyd from the representation of the borough, he was elected

M.P., although the condition of his health precluded him from taking any part in the contest. The Right Hon. James Stansfeld was his colleague, and when the result of the poll was declared it was found that Mr. Crossley headed the list. Mr. Stansfeld was also returned, the Conservative candidate, Mr. H. McCrea, being rejected. Mr. Crossley was able to attend to his parliamentary duties for a time with regularity, his health being slightly improved, and although seldom taking any prominent part in the business of the House, there were times when his special knowledge and influence proved of considerable service. For instance, on the second reading of the Factory Acts Amendment Bill, in 1874, he delivered a speech in which he put the case of the manufacturers, who were opposed to further legislation, with a good deal of ability.

Mr. John Crossley's parliamentary career was not destined to be of long duration, unfortunately, and the circumstances which led to his retirement were of a very painful nature. His own goodness of heart and simplicity of character led him into what his stronger-willed brothers would have had no hesitation in calling weaknesses. Referring to this trait of Mr. Crossley's disposition, Dr. Mellor says: "His name for benevolence spread through the nations, and men who knew nothing but his name, and who had no conceivable claim upon his help, plied him with appeals, oft but with scant modesty and consideration, as if he were possessed of all the wealth of the Indies. Morning by morning for years the usual bundle of circulars and letters came with their plans, elevations, and entreaties, and, until the evening of his days began to throw its shadow over his life and fortune, few of these, too few, were 'sent away empty.' But letters were not all. His time was largely taken up by deputations from far and near on begging expeditions, for it became only too well known that if Mr. Crossley could muster sufficient self-control to decline a written request, he was no match for a personal appeal. This was an amiable foible, but it was also a fatal one, and contributed in no mean degree towards that reverse of circumstances which saddened, I cannot say embittered, his closing years. . . . He could not bear the sight of sorrow of any kind without doing his best to relieve it. The very way to his house might be traced by the number of those who had managed deservingly or otherwise to become pensioners upon his bounty. Possession was taken of the gates of his grounds, and the doors of the house, and of his hours for meals, by importunate suitors for his charity, who had learned, in some cases only too well, that he would not and could not say them nay." But beyond this free-handed charity, Mr. Crossley permitted speculators in risky, and often worthless, ventures to get hold of him, and in this way he ultimately met misfortune. Companies, that his money had helped to float, burst; and schemes which in their projection had appeared to him of great magnitude and importance fell to the ground. He invested in coal and iron mines at a period of remarkable inflation, and was of such a sanguine and hopeful nature, and relied so much upon the promises of men whom he hardly knew, that in the end there came a collapse which left him a comparatively poor man. Mr Crossley now took leave of parliamentary life, but in retiring from the representation which he had held three years, he carried with him into the seclusion of private life the deep respect and esteem of his townspeople, and their sincere regret at the unfortunate circumstances which had led to the severance of the connection. His constituents would fain have had him withdraw his resignation; but the die was cast; he would not turn back upon a public career with a shadow hanging round his name, so, in the end, the resignation was reluctantly accepted. Shortly afterwards, Mr. James Stansfeld, addressing his constituents at Halifax, paid the following tribute to Mr. John Crossley. He said: "Since I last had the honour of addressing you I have lost a colleague: there has been a change in the representation of Halifax. No man has ever carried into retirement more completely the love and respect of his constituents and of the inhabitants of the town which gave him birth than John Crossley has done, and his name, associated with a life which never, even in a passing moment, stooped to any selfish act—a name borne by others also as worthy as himself—will descend in the memory of successive generations of this town, when we shall have passed away, in their loving, in their respectful, in their regretful remembrance." Not less affectionate and warm were the sentiments of Mr. Hutchinson, M.P., who succeeded Mr. Crossley in the representation of Halifax.

Yours truly
Edward Crossley

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John Crossley's life was now practically over. His health gave way again, and on the 16th of April, 1879, he died at Broomfield, Halifax, the residence of his son-in-law and daughter, Mr. and Mrs. Marchetti. His funeral was not less impressive than that of his brother, Sir Francis Crossley, had been seven years before.

Mr. Joseph Crossley, the other of the three sons of the founder of the Crossley firm, did not figure in public life particularly. He was essentially a business man, and although he devoted much of his wealth to practical charity, and in the realms of religion and philanthropy bore an honoured name, it was as the working partner of the Dean Clough enterprise that he made his energy of character chiefly felt. It was under his direct superintendence that most of the building extensions at Dean Clough were carried into effect, and to him, in a very great degree, was due the successful working of the vast establishment which was under his constant care. His death occurred in September, 1868.

One of the noblest monuments of the benevolence of the three brothers is to be seen in the Crossley Orphan Home and School, which was built by them at a cost of £50,000, and endowed with about £3,000 a year. It is a handsome structure, standing in a healthy situation, and was opened in 1864. It was designed to afford orphan children a liberal education, with board and lodging, and accommodates from 200 to 300 children of both sexes. Each child is required to pay from £5 to £10 a year as an acknowledgment, with the exception of 40, who are on the foundation. Children are admitted from six years of age and upwards, the boys being kept until they are 15 and the girls till they are 17 years of age.

In 1864 the firm resolved itself into a limited liability company, when one-fifth of the share capital was allotted amongst their work-people and others, the Crossley family themselves retaining four-fifths of the shares. In order not to debar those of their work-people who were unable to take up shares themselves, the firm lent them the money, with the condition that the interest on their shares should accumulate until the value of them should be covered. It was an immense undertaking, but was successfully carried through. The paid-up capital of the company was

£1,187,970. The present directors are Mr. Edward Crossley (chairman), eldest son of the late Mr. Joseph Crossley; Mr. Louis John Crossley, only son of the second John Crossley; Mr. Henry Crossley, third son of the late Mr. Joseph Crossley; Mr. G. Marchetti, who married the youngest daughter of the late Mr. John Crossley, M.P.; and Mr. John Leach, who acts as secretary as well as director. It is worthy of remark that Mr. Leach entered the office of the Dean Clough works as a lad, and by his industry and talent gradually worked his way up to his present position.

Mr. Edward Crossley was mayor of Halifax from 1874 to 1876, and filled the same office in 1885. He has been twice returned and now sits as M.P. for the Sowerby Division of the West Riding. Both he and Mr. Louis John Crossley have acquired considerable notice for their scientific attainments. The traditions of the firm are well adhered to by the managing spirits, who have now the control of the extensive business carried on under the name of John Crossley & Sons, Limited, and although the conditions of working have been much altered since the company was formed, the directorate have always been alive to the best interests of their undertaking, and have kept pace with the times. Old markets have been lost through the operation of prohibitive tariffs, new ones have been opened to them in spite of such opposition, and both at home and abroad they have been able to keep up such an attractive display of novelties that they have more than held their ground.

It will be interesting, now that we have given some account of the lives of the men who were mainly concerned in laying the foundations of the prosperity of this eminent firm, to glance briefly at the works at Dean Clough, where the carpet manufacture is at present carried on with so much success.

The Dean Clough Mills lie in a great, picturesque hollow, above which the town of Halifax rises, the hills on either side being steep and rugged. Beacon Hill—so called from its having been the place where centuries ago the beacon light was set burning in times of danger—looks frowningly down upon the town, and is not far distant from the seven immense mills which constitute this industrial colony, its precipitous side showing houses perched here and there in seeming disregard of difficulty of access.

The roads from Dean Clough are all on the slope, and are bordered by sturdy-looking stone houses which match well with the general scene. The seven mills are distinguished by alphabetical appellations, from A to G, and, with the warehouses, offices, dyehouses, and workshops by which they are surrounded, present an aggregation of manufacturing premises of wonderful extent and completeness. A squareness of aspect pervades the whole of the buildings, and as they stand there in massive proportions, with bridges connecting one group with another, and great chimneys rising to an immense height above them, they tell a tale of commercial enterprise that is of absorbing interest. The buildings range in height from seven to ten storeys, and some of the mills show a frontage of not less than 340 feet. Viewed from the vantage ground of the North Bridge, the Dean Clough valley seems to be filled, as far as the eye can reach, with factory buildings, the area covered by the works being fifteen acres, with a total floorage area of 27 acres, or 131,000 square yards. In the various operations carried on at

Dean Clough, and in other neighbouring works belonging to the firm, about 5,000 hands are employed.

The engines which supply the motive force for the various mills have a total indicated horse power of 4,648, the feeding of which represents an annual consumption of 32,000 tons of coal. There is a yearly consumption also of 21,000,000 cubic feet of gas.

It would be impossible to follow the course of this gigantic business through all its ramifications in a single article; we will content ourselves therefore with a rapid survey of the leading features of the main branch of the manufacture. Before doing so, however, it may be as well to explain that the whole of the processes, from the point at which the raw material is brought into the works to the time when as finished goods it goes out into the markets of the world, are performed at Dean Clough. Their business includes the manufacture of carpets, rugs, and table-covers of the description called "tapestry," the production of Brussels carpets of every variety, and the making of rugs and carpets in which the texture is a combination of materials that yield striking results in close resemblance to sealskin, mohair &c. There are three leading processes. In the manufacture of "tapestry" carpets the yarn is printed, according to the required colours and design, while on a drum; for the making of Brussels carpets the yarn has to be dyed before being sent to the loom, and the patterns are wrought by the Jacquard engine, with its "house of cards" over each loom; and then, for "finger" rugs, there is the hand process.

Visiting the warehouses where tremendous piles of wool, cotton, and hemp lie stored ready for being put under manipulation, we are astounded at the vastness of the firm's dealings at the outset, for in these rooms is raw material of enormous value. The wool is washed, dried, and carded or combed in the same as for the worsted manufacture. Then it is "drawn" and spun to the desired strength and thickness, being twisted and doubled to an amazing degree. The yarn is then reeled into hanks, after which it is purged of oily impurities by being submitted to the scouring and cleaning process, and bleached and dried, and wound upon bobbins. If intended to appear before the world as Brussels carpets, the yarn is now ready for the dye-house; while if for "tapestry" or velvet-pile carpet, it has to go to be printed. "The method adopted for the production of the 'tapestry' and velvet-pile consists in printing a pattern upon the warp threads, each separately," we are told, "which are afterwards arranged in a parallel series ready for the loom, and then weaving these threads into a fabric. In order that large quantities of such warps may be rapidly and economically printed, the clean yarn is wound from the bobbins upon huge wooden drums, some of which are eighteen feet in diameter, in one layer only, six, eight, or even twelve hanks of yarn going upon one drum. A small trough, containing colouring matter, in which there revolves a disc, is then passed under the drum, across its width or thickness, and marks upon the yarn a stripe of colour the width of the edge of the disc. The drum, which is all the while suspended upon a horizontal axis, is then slightly turned, and another trough with some other colour determined by the pattern to be made is passed under it, producing another coloured stripe next to the one at first printed. The process is continued until the entire circumference of the drum has rows of various colours drawn across it. As many times as a thread can be wound around it, so many lengths will there be of similarly-coloured threads, each of which will go to form one thread for the warp of a particular-patterned carpet. Thus, if 1,000 threads are printed side by side upon this drum, there is one thread ready for each of 1,000 carpets. By dividing the circumference of the drum into a certain number of parts to correspond to the number of 'scrolls' in a carpet, and by guiding the printing with a 'design-board' similarly divided, the greatest regularity and despatch in the colouring of the threads for various patterns is attained. The process upon the drums is repeated for the different threads in any given pattern, until the warp is completed in the number of carpets of the particular pattern wanted."

We now see the hanks of many colours taken from the drums on to creels, and subjected, in another department, to the process of steaming, by which the colours are rendered "fast." The greatest precaution has to be observed, however, not to get the yarn mixed, but a system of numbering and classification obtains for the avoidance of mixings and complications. A little army of girls now take the threads in hand and wind them on to bobbins, and then the "setters" take them up and place the threads side by side in the order demanded by the pattern.

"We now have a series of bobbins, corresponding with the number of threads across the warp, arranged, according to the pattern, upon a rack, from which they are drawn parallel to one another upon a frame. It is the duty of the 'setter'—generally the most intelligent of the female operatives in the mills—to see that the threads are so drawn from the bobbins that when side by side and forming a flat surface the pattern upon them shall be clear and distinct, although it is necessarily elongated, to allow for the space taken in by the weft and wire. Here a flaw in the printing, or a wrong number on the rack, is instantly detected and corrected. The 'setter' must see, if necessary, that the legs of all the horses in the patterns are straightened; that the eyes of parrots do not appear away from the parrots' heads; and that leaves and roses do not sprout from the lamb's necks. Such freaks of nature are not allowed upon carpets, and so well-trained and quick are the watchful eyes of the 'setters' as they bend over the slowly advancing threads, so quiet are the 'setters'' rooms, that no monstrosities either in the natural or geometrical world ever escape them."

These processes, the description of which we quote from a writer in the *British Trade Journal*, are all of the most interesting character as seen in operation at Dean Clough. The stage has now been reached at which the warps have to be brought into contact with the looms, there to be intermingled with the "backing," which also came into the mills in bales, and has passed through the processes of carding, roving, and spinning, as did the worsted threads. Then we advance upon the weaving department, where still greater cause for wonder awaits us. The array of numberless looms, the stores of patterned warp, smoothly packed on beams, the quantities of yarn for "backing," and the lengths of carpeting as they slowly emerge, amidst an incessant din, from the loom, constitute a sight that will not easily be forgotten. As many as four hundred ponderous looms are to be seen at work in one room, some of the "tapestry" looms being as much as "sixteen quarters" wide. As the light falls from the windows across the gay colours of the webs, with the bright shuttles leaping from side to side —as the rich designs twine themselves round the beams upon which they repose until the patterns and pieces are worked through—as the weavers keep constant and careful watch over the growing carpet—the whole scene is one of picturesqueness and beauty despite the clatter and the noise, and the whir and buzz of wheels, and pulleys, and drums, shaking the building to its foundations. The looms engaged in the weaving of velvet-pile carpets are of a more complicated construction than those which are employed upon the plain-looped "tapestries." They are fitted with a row of wires, at one end of which are small knives which cross the warp as though they were weft-threads, and as such they appear to be woven into the fabric, being covered by the warp threads. When a series of eight or ten is thus covered, the wire which was first inserted is, by an ingenious contrivance, drawn away horizontally, and the sharp steel blade at its end cuts through the whole breadth of the warp, leaving a row of "pile" threads standing upright, which are held firmly in place by the weft. This process of drawing out the wires one after the other, and then inserting them again, to be covered by new loops of warp-threads, is continued until the entire lengths of the carpeting are woven. A similar process is adopted for the making of velvet-pile Brussels carpets, and for the manufacture of imitation sealskin and mohair.

The department devoted to the weaving of Brussels carpets is perhaps equally interesting. Some of the looms in this department occupy an extraordinary amount of space. Behind them are long frames filled with bobbins of worsted, each thread being of a separate colour throughout. The frames holding these bobbins cover nearly twice as much space as the loom in front of them; in which, we further observe, a number of perforated pieces of cardboard, each about fourteen inches long by three inches in width, jointed together, which topple over, ever and anon, from one part of the loom and appear to vanish among the threads of warp and weft. These looms, which cover about 4,000 square yards of flooring, are making Brussels carpet, and the cards belong to the Jacquard engine. The surface-threads in both "tapestry" and Brussels carpets are looped, and it needs an experienced eye, and perhaps some scrutiny, to say by which process a given carpet has been woven. One of the recent additions to the Dean Clough works is a large new shed, to which the name of the Victoria shed has been given. This is meant to be used chiefly for the weaving of the class of carpets known as "Victoria Squares." A single loom covers a very large space. Each loom is of a very massive description, every portion of its machinery being of strong and powerful make, while the Jacquard engine that hangs overhead like an immense canopy, with its wonderful array of cards, seems to give to the whole an aspect of still greater solidity. In these looms carpets four yards in width are woven. Behind stretch the threads of the yarn, on a huge frame. Strong men are there to superintend the operations. There is a Brobdingnagian suggestiveness about the whole scene.

It ought to be mentioned that the whole of the machinery used by the firm is made by themselves, on the spot, and includes many valuable new patents which serve to keep them well in advance of the time with their manufactures. It is the same now as it was when Sir Francis Crossley was one of the ruling spirits at Dean Clough—the inventor is always at work for them, working out improvements; and though many of the patents which brought wealth with them have passed out of the region of protection, others exist which are of infinite service to the company in maintaining its great reputation. From the looms the velvet-pile carpets and rugs are taken to be "cropped," a process which is to a pile carpet what mowing is to a lawn, producing a surface of fibres of exactly the same length. The Brussels and tapestry carpets and rugs are dried, and their ends are stitched, all the carpets being subjected to a minute inspection before they are passed forward to the store-room ready for despatch to customers.

To the visitor uninitiated in the art and mystery of the carpet-manufacturing processes—one who simply comes to gaze and wonder at the perfection to which the production of carpets has been brought—the preliminary work of making the designs for the thousands of beautiful carpets woven at Dean Clough will be a matter of special delight, for, if he be permitted to inspect the artistic work which is here accomplished, by men who have great natural gifts for design, and who have undergone courses of long training to fit themselves for tasks to which they now devote their energies, he will see such a variety of designs as will make him think he is in some fairyland of art. Students from the schools of designs find here a fine field for the exercise of their talents, and as fancy after fancy is put upon paper, touched up with brilliant colour here and there, and wrought at last into a settled design, the artist eyes it with as much satisfaction as if he were a Rossetti or a Burne Jones who had just finished the depiction of some "fleshly" maiden upon canvas.

So much depends upon the designs that are produced that, necessarily, the very highest ability must be employed in this department, and it matters not whether the artists be English or Italian, Scotch or French, if they can only give the results that Messrs. Crossley desire. How well they have been served in this branch of their business is sufficiently evidenced by their success. No amount of cheapening of production would have availed them anything if they had not also been able to take the lead in the beauty and originality of their designs. The designs are drawn in the first instance, on paper diced with little squares, and if the design, as sketched in black and white, is approved, it is then drawn in colours on paper diced with larger squares, containing sub-divisions equal to threads or loops, after the style of Berlin wool-work. It may be that the design is for a rich carpet for the drawing room of some lordly English mansion; it may be that it is for the carpet of a Mohammedan, who will require that at the hour of prayer the patterns shall always point to Mecca; or it may be that it is for a rug whose destination will be some Roman Catholic church in a remote city of South America. All tastes have to be considered, and all changes of fashion have to be provided for. If the rage is for things æsthetic, Messrs. John Crossley & Sons will take care that their looms give forth a goodly proportion of æsthetic carpets; if the Japanese craze has got possession of the public mind, the firm will see to it that their carpets are radiant with flying storks, and dashing intersections of all kinds of contrasted scenes and colours; and if the taste of the public should be for a brief period in the direction of puritanical purity, they will see that the requirements of plainness and simplicity, soberness and sombreness, are duly administered to.

The show-rooms, in which the various samples of the finished carpet are to be seen at Dean Clough, are perhaps the most attractive portion of the establishment, for there it is that the goods can be inspected in all their newness and beauty, ready for transmission to all the ends of the earth. The firm have from 6,000 to 7,000 patterns and colourings of different kinds of goods, including "tapestry" and Brussels carpets, to show. Furthermore, each pattern is capable of being produced in a number of distinct arrangements of colour, so that the variety of patterns may be said to be almost endless. This is truly marvellous! All the colours of the rainbow are here unfolded before the ravished sight, new colours and old, in all sorts of combinations. As we gaze at the rich piles of floor-coverings—some with rich mosaic-like pattern fit for the adornment of the tent of an Oriental Prince, some in which the dainty arabesques of the Alhambra are reproduced with startling fidelity, some that almost seem alive with well-defined figures of birds and beasts, and some that are so rich, and thick, and velvety as to suggest all the luxury, repose, and noiselessness of a royal palace—as we look upon these works of art and industry, the mind goes back to the far-off places where all these elements of beauty and harmony existed apart from each other, with not even so much sympathy between them as there was between the two palm trees of Heine's immortal verse. We think, perhaps, of the wool coming across the mountain regions of Asia Minor on the backs of mules, or being carried over the sandy plains of Australia by the waggons of the sheep-farming colonist; we think of the "dyes innumerable," that are sent from the lands of the Pacific; and we think of the thousands of human hearts and brains whose feelings, impulses and prospects have been interwoven with and affected by these splendid products.

It is worth while alluding, also, to the many auxiliary trades which are carried on at Dean Clough—trades which are altogether apart from the actual processes of the carpet manufacture, but which are, nevertheless, necessary to its complete working. There is a machine shop, in which over a hundred workmen are constantly employed repairing any breakage or fault that may arise amongst the machinery; there is a large shop where a great number of men are constantly kept sawing, planing, or turning; and there are the dye-houses, in which all the various operations of dyeing are performed, with a success that has had much to do with upholding the firm's prosperity, for upon the superiority of the dye of a carpet its quality and appearance very greatly depend. In the dyeing department, indeed, Messrs. John Crossley & Sons have employed the best available skill, and under the control of their present manager, their achievements in this direction have excited general admiration. The dye-houses cover a large extent of ground, and are fitted up with all the best appliances that modern ingenuity has been able to devise. Messrs. Crossley, it may be added, do a large business in the export of printed worsted yarns.

Not far from the gates of the works stands the Crossley Institute, established on the Mechanics' Institution principle. It was built and furnished by the firm at a cost of £7,000, exclusive of the value of the land, and contains good circulating and reference libraries, a reading-room, a large lecture and concert hall, billiard rooms, &c. In fact, the Crossley Institute is a working-man's club, where the *employés* can avail themselves of most of the privileges enjoyed by the wealthier classes in clubs of greater pretensions, at the cost of a few pence per quarter. The firm have also established a provident society in connection with the works. The fund for the maintenance of this society is contributed to in a peculiar manner, not by subscriptions regularly levied, or by voluntary donations, but is kept afloat by the fines which late-comers have to bear.

The workpeople have also a saving's club, managed by themselves, with savings amounting to £35,000. It ought to be mentioned also that ample provision is made for protection against fire, a special Fire Brigade, with two powerful fire-engines, being part of the general organisation of the works.

By the side of the main-entrance there is a little office in which a lynx-eyed time-keeper maintains watch and ward. It is this official's duty to see the "hands" in of a morning and at meal-times, and if any one happens to be five minutes late—and in a body of some 5,000 human beings subject to the ordinary incidents and accidents of life there must always be a few, and sometimes a good many, laggards—the time-keeper makes a record of the fact, and when the wage-day arrives a penny is deducted for the benefit of the provident fund, but as all share in the benefits none can grumble at having to pay. Ordinarily, masters make these fines into a provident fund for themselves alone.

All through their long and successful career Messrs. Crossley & Sons have held the most satisfactory and agreeable relations with their workpeople. How harmoniously they have always laboured together was shown by reference which the late Mr. John Crossley made to the subject on the occasion of the workpeople at Dean Clough presenting him with a testimonial of their esteem shortly before his death. He said, "Within my recollection, the old mill at Dean Clough started at half-past five in the morning, and worked on with trifling interruption till eight p.m. My father and family removed from the centre of the town in June, 1824, but the old mill had then some years been in his occupation. That same year, at the early age of twelve, I was put to work in the old mill, and with the exception of being sent to school from June, 1825, to June, 1826, I may be said to have been pretty hard at work ever since, a period spreading over fifty two years. Looking back on this long period of time, it is a real and solid satisfaction to me to be able now to say that, after giving employment to so large a number of workpeople, numbering about 5,000 persons, and of these a large proportion of men, no dispute or misunderstanding has ever occurred but such as was there and then by mutual compromise, adjusted, with one single exception, nearly forty years ago. We had then what is now too seriously known as a strike of some ten days' duration." That this could be testified, after so long a connection, said much for the good feeling that had always prevailed between masters and men at Dean Clough. That good feeling still exists, for the same wise generosity that distinguished the founder of the firm and his three sons has been inherited by the later generation of Crossleys, who are now the ruling and controlling spirits of the Dean Clough works.

And, apart from all this, the Crossleys have been the means of enriching Halifax, while they have enriched themselves. To them, chiefly, Halifax owes its commercial greatness; to them chiefly the noble character and grand scope of its benevolent institutions; to them chiefly its fame amongst the towns of the North. "If the Lord should aid us at this place," said that fine-hearted woman, Martha Crossley, tramping to her work that dark morning at four o'clock, more than half a century ago, "the poor shall taste of it." Success came, in a far greater measure than she had ever dreamed it could come, and the poor did "taste of it," and so they will continue to do into the far future, for the benefactions of the Crossleys will last through the ages, and be a memory and an influence for ever.

Many "fortunes" have been "made in business" by the Crossleys, and it is to be hoped that other Crossleys will live to make many more. A race such as theirs should never become extinct.

THE KITSONS OF LEEDS.

THE KITSONS OF LEEDS.

THE railway approach to Leeds is through an atmosphere of smoke and fire, and all the surroundings are indicative of dinginess and gloom. A great town looms there panting for breath, while a thousand factories, forges, and workshops seem to be doing their best to stifle it out of existence. Great furnaces belch forth flame, tall chimneys emit vast volumes of lurid smoke, and miles on miles of brick buildings crowd the view in all directions, with smoke-clouds above, around, and upon them. The aggregation of duskiness, not to say depression, which is thus presented is not altogether prepossessing. Still, to the mind accustomed to take cognizance of the various evidences of industrial prosperity, there is something invigorating and attractive in this seeming pandemonium, for every flash of flame, every puff of smoke, is a manifestation of power. Many are the fortunes which have been won, and are now being made, amidst that dark shadowland, and as the heavily-freighted trains pass into, or emerge from, its obscurity, they bear with them many links of connection between Leeds and the rest of the world, for Leeds, with its population of 350,000, and its great variety of industries, has dealings with all civilized countries and carries its trade-mark into all the regions of the earth. It was the locomotive that was the means of bringing most of these industries into the town. Until the railway came, with its message of amity, and its suggestions of expansion, Leeds had been content to live for the most part upon its clothing trade, but no sooner was the line between Leeds and Manchester in operation than the men of the woollen metropolis began to exercise their minds with new schemes of money-making. It was then that the iron industry, which had existed in Leeds in a small way from a very remote period, showed signs of active revival, leading to the establishment of iron-working undertakings of all kinds in the town, and notably to the setting up of works for the building of locomotive engines.

Long before Leeds had become celebrated for its cloth, it had gained a reputation for its iron. Indeed, there is little doubt that, ages ago, iron-mining was carried on upon the site of the present Briggate, the principal street of the town, and one of the finest thoroughfares in the North of England; but notwithstanding this historic testimony, the iron industries proper did not receive true development until the early years of the present century. Leeds has been fortunate in having produced, or, at all events, adopted a number of men of high mechanical attainments—men who have possessed great inventive genius, as well as excellent business capacity. To these men Leeds owes much of its present industrial eminence and prosperity. They have always been alive to the necessities of the time, and as science has advanced further and further into the domain of labour, have never allowed themselves to fall far behind its heels. It was the Leeds firm of Fenton, Murray & Wood that ran Boulton and Watt so close a race with engine-building that the latter grew jealous, and had recourse to the not very honourable device of buying up and holding as waste a large plot of ground adjoining Fenton & Co.'s works, with the object of preventing the extension of their concern. It was at Leeds that the locomotive was first employed for commercial purposes, Mr. Blenkinsop having, with the aid of Matthew Murray, the chief working partner of the firm of Fenton & Co., brought into use an engine with a double cylinder on a railway line extending from the Middleton Collieries to Leeds, a distance of some three and a half miles. This was in 1812. The peculiarity of Blenkinsop's engine was that it had a cogged-wheel which worked into a cogged-rail. Its speed was about three and a quarter miles an hour, with a train of thirty coal-waggons.

Locomotives did not come to be made in Leeds, in the ordinary way, until some quarter of a century later, when the truth of Edward Pease's prophecy came to be realized, "Let the country but make the railroads, and the railroads will make the country." One of the first men to take advantage of the new order of things was Mr. James Kitson. George Stephenson's "Rocket" inaugurated the railway revolution in 1830, and a year or two later, Mr. Kitson was at work in Hunslet, a suburb of Leeds, assisting in a small way in the production of railway material. Mr. Kitson read the signs of the times correctly, and rightly estimated his own powers, when he began business as a locomotive engineer. At first he only did miscellaneous work for locomotives, but was fortunate enough to get employed by many good firms, including the Stephensons. In 1835 Mr. Kitson was fairly launched in business, and two years later it was known that he was building his first locomotive, his workshop being the bottom story of a little old cloth-mill that until recently stood as an interesting relic of humbler days and formed part of the Airedale Foundry, the present locomotive works of the firm of Kitson & Co. A couple of cloth-looms were in daily work in this room where the engine was being built; the former representing the power of the past, the latter that of the future. The locomotive-engineers occupied about two-thirds of the room, and the cloth-weavers the remaining third. It was soon noised abroad that Mr. Kitson was constructing a railway engine, and visitors came from far and near to watch the progress of the work, a locomotive being an object of great curiosity in those days. There were some who imagined Mr. Kitson was attempting an engineering feat that he would be unable satisfactorily to accomplish, the fact that there was no doorway large enough to admit of the egress of the engine when complete striking the natives as such a piece of absurdity that they freely joked about it. Mr. Kitson merely smiled and went on with his work, remarking that it would be soon enough to think about a means of exit for the locomotive when it came to be completed. He stuck manfully to his enterprise, and in due time his friends and neighbours were asked to inspect the engine in its finished condition, ready for the railway. They came, admired, and praised Mr. Kitson's achievement, but still they smiled dubiously as they glanced towards the doorway, through which no locomotive had ever passed or could pass ; but Mr. Kitson soon solved the difficulty by knocking down a portion of the front wall, and it was through the opening thus made that Mr. Kitson's first locomotive was brought out into the open air, and sent forth on its first journey.

The engine was found to be equal to all requirements, and orders for locomotives began to pour in upon the young engineer with surprising rapidity. As time went on, the cloth-looms had to be removed entirely, and Mr. Kitson took possession of the whole of the bottom story of the old mill; then, his business extended so much that he entered upon the occupancy of the entire factory. It was in this way that the industry of locomotive engineering came to be grafted on to Leeds, and while Mr. Kitson's business grew year by year, his example brought forth many worthy followers in the same field, and to-day this particular branch of industry provides thousands of Leeds mechanics with good employment, and forms one of the most prominent features of the prosperity of the town.

As time went on the Airedale Foundry was greatly extended, adjoining land and buildings being purchased from time to time, until now these works cover an area of ten acres, and afford employment for about 1,500 workpeople. In addition to this place, Sir James Kitson, the present head of the family, is the owner of the Monk Bridge Ironworks, at Holbeck, and there 700 workpeople are engaged on an average. Messrs. Kitson & Co. now turn out about 150 locomotives per year, and about 50 tramway engines, while in the production of high-speed engines and machinery they find considerable work. The firm has all along kept abreast of the times. They are to-day to the fore with the tramway locomotive as in the old days they were with the railway locomotive, and, since electric lighting became one of the features of city life, they have been very active in the manufacture of engines specially adapted for supplying motive power to electric machines.

Messrs. Kitson & Co. made a number of high-speed engines for the Suakim and Berber Railway, which were to be lighted by electricity, to enable the work of construction to be carried on by night. The engines and the dynamos were on trucks, and were to advance with the line as it was laid. As events subsequently turned out, however, this military railway had to be abandoned, but the step in advance that Messrs. Kitson & Co's. engines denoted was not on that account lost.

In the building up of a great industry like this, much energy of character has been required, and a keen perception of the ever-changing demands of a commercial community, and in the Kitsons, father and sons, these qualities have been powerfully displayed. The founder of the firm, Mr. James Kitson, enjoyed the friendship of the

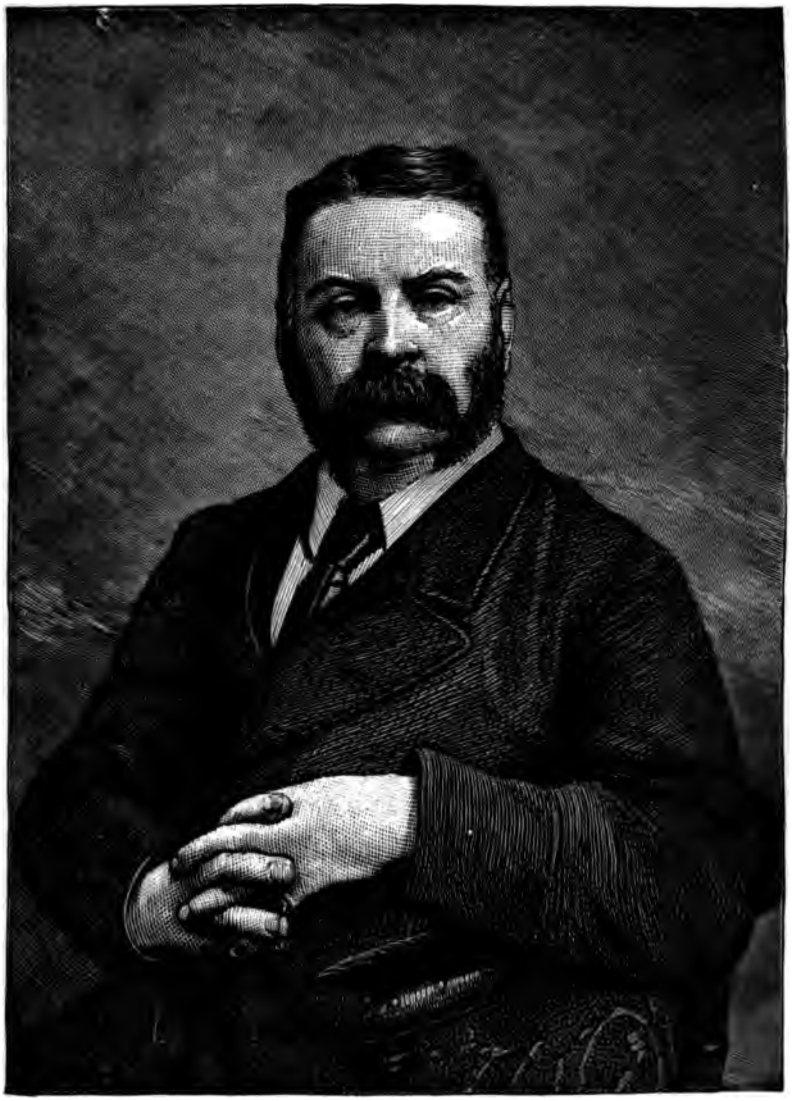
Stephensons and other builders and projectors of railways, and their recognition of his business thoroughness had doubtless much to do with establishing his success as a maker of locomotives. There were many dangers to guard against in those early days of the railway system, when men rushed blindly into speculation, anxious at all hazards to connect themselves with what they believed to be the chief money-making power of modern times. Not only did the railway mania absorb the attention of the reckless multitude whose whole desire was to gamble for premiums, but it attracted a host of men into business enterprizes for the production of railway material, a large proportion of whom were speedily driven back into obscurity for the reason that their brains were not always equal to their ambition. Mr. Kitson was not one of these. He never swerved from the purpose he had set himself to accomplish, never deviated from his course, but plodded steadily on, year after year, until in the end he found his position secure and unassailable. A few years after Mr. Kitson started in business, a short line from Leeds to Bradford (now absorbed in the Midland system) was projected, and George

Stephenson met the directors at Ben Rhydding, a famous hydropathic establishment near Ilkley, and, in an after-dinner speech, made the remark that "Yorkshiremen were reckoned clever men, and his advice to them was, to stick together and promote communication in their own neighbourhood." It needed no caution of this sort, however, to keep men of James Kitson's stamp from over-reaching themselves in hazardous speculation. Mr. Kitson had hit upon a business enterprise that was well within his capacity, one for which he had great aptitude, and one that presented him with opportunities that he might have looked for in vain in any other direction. Kitson's locomotives grew rapidly into favour, and from that time to this the rate of production has gone on increasing, while other branches of the iron and steel industries have been added to the original undertaking.

Mr. Kitson was induced, as his business expanded and became an established success, to give a portion of his time to the public affairs of the town. Elected to the Town Council, he did much useful work, and took a very active interest in the promotion of local movements for benefiting the people. He took a foremost part in connection with the opening of the Leeds Town Hall in 1858, and was of the chief promoters of the Musical Festival on that occasion, in honour of the visit to the town of the Queen and the Prince Consort. Mr. Kitson was himself an amateur musician of considerable ability, and in fulfilling the duties of chairman of the Orchestral Committee, had a task for which he was well fitted. This Festival gave the cue, there is no doubt, for the organization of the present Leeds Triennial Musical Festivals, which have done so much for the cause of music in this country, and which always had the earnest support of Mr. Kitson. In 1860 he was appointed to the office of Mayor of Leeds, and filled that post with so much honour, dignity and distinction that he was re-elected the following year. Many important duties devolved upon him during his two years' occupancy of the mayoral chair, but he proved himself thoroughly equal to their performance, and by his untiring assiduity and his eminently practical way of handling the most complex public matters, earned for himself the respect and admiration of his townspeople. A pair of fine sculptured busts of the Prince and Princess of Wales were presented to the Leeds Corporation by Mr. Kitson, and now adorn the vestibule of the Town Hall. Mr. Kitson was at one time president of the Leeds Mechanics' Institution, and was chairman of the Building Committee of the Leeds General Infirmary. In the latter capacity he was called upon in 1864 to lay the foundation stone of the present handsome building, which was opened in 1869, a fine art exhibition having been held in the building the previous year, the Prince of Wales performing the inaugural ceremony. The Leeds Mechanics' Institution for many years received his devoted attention. In his youth he had been a diligent student in its drawing and mathematical classes, and when in later years he was in a position to assist in its management, he did so ungrudgingly. During the period of his presidentship of this popular educational institution he was brought into contact with many men of distinction, whose services were given so freely in those days towards the improvement of the people, and secured the friendly recognition of such men as Lord Brougham, Bishop Wilberforce, Robert Stephenson, Lord Houghton, the late Lord Lytton, Earl Russell, Lord Morpeth and others, with whom he came in frequent contact. Mr. Kitson was chairman of the Leeds Northern Railway, and one of the negotiators for its amalgamation with the York, Newcastle and Berwick, and the York and North Midland lines into the present North Eastern system. He was a director of the North Eastern Railway Company, and was at one time chairman of the Yorkshire Banking Company. He was also a magistrate for the West Riding and for the borough of Leeds.

His residence was at Elmete Hall, Roundhay. He died in June, 1885, at the age of 78, having for some years previous to his decease withdrawn himself from active participation in public or business life. He was twice married. By his first wife he had six children—Mr. F. W. Kitson, Sir James Kitson, Mr. J. Hawthorn Kitson, Mr. Arthur Kitson, Mary, wife of Professor Clarke of Cambridge, and Emily, wife of Dr. William Playfair; and by his second wife, who is still living, two sons and two daughters. For a long time previous to his withdrawal from business, Mr. Kitson had been assisted in the management thereof by his sons, Mr. F. W. Kitson and Mr. James Kitson (now Sir James Kitson), who proved themselves in every way worthy of the name they bore. Their accession to the firm imparted fresh vigour to the already large business undertaking, and, fast as the enterprise had developed during the period of its infancy, it now expanded at a more rapid rate than ever. Unfortunately, Mr. F. W. Kitson, the eldest son, died in 1877, but in the next son, James, the firm found a manager of indomitable energy, infinite tact, and remarkable shrewdness; and for the last twenty-five years he may be considered to have been the chief guiding power of the two establishments with which the family name is associated, and in which he fills the position of senior partner.

Sir James Kitson was born in Leeds in 1835. This was the period when his father was just launching his much-talked-of engineering venture. The population of Leeds was only about 130,000 and as yet there was not a single line of railway running from the town. As a lad, young James saw much of his father's mechanical contrivings, and took a great interest in them, but there was the important work of education to be thought about before he could be allowed to take any active part in them His earliest scholastic train-



Sir JAMES KITSON, Bart.

ing was received at the Wakefield Proprietary School, and, later on, he studied at the Uuiversity College, London, where he acquitted himself with great credit. So anxious was he, however, to enter upon a business career that before he attained the age of twenty, in 1854, he had commenced operations as an iron manufacturer at Monk Bridge, in partnership with his elder brother, Mr. F. W. Kitson, the Monk Bridge Ironworks, founded in 1851 by Mr. Stephen Whitham, having been purchased for them by their father for that purpose. Sir James Kitson here found ample scope for his energies. He seemed to have discovered his natural element. A man of iron will, iron nerve and iron strength, he was the very man to control an army of ironworkers, and direct the exciting processes necessary to the making of the metal. At all events, he made the works a success, and for many years devoted himself so completely to the work he had undertaken that little was heard of him outside the business circle. Leeds was made aware from time to time that the Monk Bridge ironworks were extending their borders, and that the fire and fury, the clash and roar, of the Monk Bridge furnaces and hammers were growing more and more evident; but that was all. The hand which directed this did not obtrude itself upon the public gaze. But the mind that was capable of achieving so much for business ends was also equal to the task of directing affairs of a more public nature, and as years went by, and the old works and the new were amalgamated in one partnership—when success had yielded competence of means, and the cares of management could be to some extent deputed to others—Sir James Kitson yielded to the solicitations of his friends and allowed his name and ability to be associated with certain public movements with which he was in accord. Being both a worker and a thinker, his services were held in great regard, and when once he had broken away from his business reserve he soon found that his public engagements were rather numerous. The cause of education was the first to enlist his sympathies. He always exerted himself on the popular side, and in connection with the works of Mechanics' Institutes did much good and useful labour. For seven years he filled the post of honorary secretary of the Yorkshire Union of Mechanics' Institutions, and familiarized himself with every detail of the working of these "colleges for working men," as they have been not inappropriately termed. He was one of the most active supporters of the movement for establishing a Mechanics' Institute at Holbeck, where so many of his workpeople resided, and assisted the project liberally with time and money. He was a member of the building committee of the institute, and interested himself in the erection from first to last, accepting, when it was finished, the position of one of the trustees. Having strong Liberal views—belonging, indeed, to the advanced school of political thought, and in religious matters allying himself with the Unitarians—it is not surprising that when the Birmingham Education League came to be formed, after the passing of Mr. Forster's Act, Sir James Kitson should have thrown himself heart and soul into the movement. It was mainly through his efforts that a public meeting was about this time convened in Leeds, with the object of starting a Leeds Branch of the National Education League. The branch was formed, and Mr. Kitson was elected secretary, subsequently being made a member of the Council of the League at Birmingham.

From this time forward, Sir James Kitson became an acknowledged factor in local politics. He was a good speaker, a zealous worker, a man of fixed views, and always reliable; no wonder his party should accept him with open arms.

In the crusade against sectarianism he for many years took a most active part, assuming from the first a firm and decided position, from which he never deviated. Right or wrong, he was an advanced Radical, and in advocating the views of his party never showed any half-heartedness or tendency to waver; his mind was made up—he had thought the subject thoroughly out—and, having the full courage of his convictions, always expressed himself with a vigour and a boldness which there was no mistaking. Of such stuff political leaders are made; and gradually Sir James Kitson advanced in favour with his party, always bearing a manful part in their battles, until he gained so much prominence as the exponent of their policy that he became their chief.

For some years now, Sir James Kitson has been the president of the Leeds Liberal Association, and in that capacity has performed many honourable and often highly responsible duties. An ardent admirer of Mr. Gladstone, he in 1880, at the general election, took a very prominent part in promoting the candidature of the right hon. gentleman as a representative for Leeds, and although Mr. Gladstone was at the time engaged in the now historic campaign in Mid-Lothian, and afterwards elected to sit for that constituency, he was also returned along with Mr. John Barran for the Yorkshire borough. Sir James was the chairman of the Liberal committee on that occasion, and proved himself eminently fitted for the post. An election fight was never more energetically managed. Though feeling very strongly on certain points, and pledged to the fiercest opposition to the Conservative party and the Conservative policy, he did not allow himself to give way to bitterness or rancour; but fought a good fight and achieved a splendid victory on gentlemanly lines.

When Mr. Gladstone announced his intention of relinquishing the honour which Leeds had accorded him in returning him as its representative, the name of Mr. Herbert J. Gladstone was brought forward, and the compliment that had been paid to the father was now extended to the son, and Mr. Herbert J. Gladstone was duly returned as one of the Liberal members for Leeds. Mrs. Gladstone and her son were during this brief election period the guests of Sir James Kitson, at his residence, Spring Lodge, Headingley. A few months later, in October 1881, it fell to Sir James to entertain Mr. Gladstone himself, who visited Leeds for the purpose of thanking the constituency for the honour it had done him in electing him the previous year. The occasion was made the most of by the Liberals of Leeds—and the West Riding generally—and what with the organising of banquets, meetings, monster demonstrations, and torchlight processions, and the still more pleasing duty of acting as host to Mr. Gladstone, there was more than enough for Sir James to manage and control. But he was equal to the strain, great as it was. Mr. Gladstone's visit extended over three days, and for each day an impressive demonstration was arranged, affording all sections of the Liberal party of the neighbourhood special opportunities of showing their enthusiasm for the statesman who, at that time, more perhaps than at any other period of his career, was regarded as the personification of Liberal triumph. The visit was well timed, and, thanks to Sir James Kitson's power of organisation, every circumstance and detail connected with it was managed with the precision of clockwork. Greater crowds were attracted to Leeds during those three days than had ever been gathered there before, except, perhaps, on the memorable occasion when the Queen and the Prince Consort visited the town for the purpose of opening the Town Hall in 1858. The banquet to Mr. Gladstone, in the Leeds Coloured Cloth Hall, was an imposing demonstration; the aristocracy, wealth, and power of Yorkshire Liberalism were well represented; and, as chairman of the immense gathering, Sir James' position was one that conferred distinction and honour upon him, and one for which he proved himself well qualified. The speech in which he welcomed the Premier that evening was one of those manly, outspoken utterances which are so well in accord with Yorkshire heartiness.

It is not as a mere politician that Sir James Kitson has won for himself a place in the affections of his townspeople, nor is it simply as the head of an extensive business undertaking and a large employer of labour. He has interested himself earnestly in matters connected with the social condition of the people, especially in the promotion of a movement for the erection of model dwellings for the working-classes of Leeds. In the year 1862, he, along with the late Mr. R. M. Carter, Mr. James Hole, the late Mr. Fred Jackson, and others, launched a scheme with this object; they bought plots of land in several favourable situations in the suburbs of the town, and built thereon fifty-one houses in all, on a greatly improved plan; these houses still remain amongst the best of their class in the borough, despite the considerable progress that has been made of late years in the matter of the housing of industrial families. The houses were erected with the view of enabling working men to become owners, as well as occupiers, of them on easy terms. Upwards of £20,000 was expended on the scheme, which, though intended expressly to benefit the operative classes, was not professedly a philanthropic undertaking, Sir James and his colleagues knowing too well the danger of doing anything that would savour of an interference with the spirit of independence which is so strong a characteristic of the northern working-man.

The project was carried out on a thorough business basis; each purchaser was expected to reside, to begin with, in the house he bought; and he had to pay down one-fifth of the cost, the Leeds Permanent Building Society advancing the remaining four-fifths, which was repaid by instalments. By this means a number of working men were enabled to obtain, at a cost of £150 each, good, respectable-looking, conveniently-arranged houses. The scheme would have been continued to a much greater extent had not a sudden inflation in the building trade made it necessary to suspend operations. The good effected by this movement has been of a permanent character, having been continued by artizans on the same principle but acting independently, and if for nothing but the practical example it has afforded to the class for whose advantage it was undertaken, is deserving of being remembered.

Sir James Kitson was for some years a member of the Council of the Leeds Chamber of Commerce, and was elected president of this important body in 1880, serving in that capacity both that year and the year following. He is a member of the Institute of Civil Engineers;

a vice-president of the Iron and Steel Institute; a member of the Council of the British Iron Trade Association; and a Justice of the Peace for the Borough of Leeds, and the West Riding. He was one of the founders of the Leeds Trained Nurses' Institution; was a director of the company which founded the Girls' High School in Woodhouse Lane, Leeds; and is vice-chairman of the Board of Directors of the Grand Theatre, Leeds, Sir Andrew Fairbairn being the chairman.

On the occasion of the general election of July, 1886, he was prevailed upon to offer himself as a candidate for one of the divisions of his native town, and, much to the surprise of his party, was defeated, though the majority against him was only 43, his opponent being Mr. G. W. Balfour, a nephew of Lord Salisbury. Had not the Home Rule question been the test point, causing the secession of many Liberals, there is little doubt Sir James would have been elected by a good majority. He had the consolation, however, of receiving a baronetcy from Mr. Gladstone on the Liberal Government relinquishing office, and is regarded as a certain future member for the Borough of Leeds.

Sir James Kitson's relations with his workpeople have always been of the most agreeable character, as has been several times very pleasantly testified by the workpeople themselves. In 1879, when the 25th anniversary of the starting of the Monk Bridge Ironworks was reached, the workmen of the establishment presented Sir James with an address of congratulation, from which may be appropriately quoted the following pregnant paragraph: "The sound judgment and indomitable perseverance of Mr. Kitson, your father, and the distinguished engineering skill of your late brother, Mr. Frederick William Kitson, have no doubt contributed to this success; but we are perhaps not mistaken in thinking it to be mainly due to your own pre-eminent business capacity, decision of character, and uprightness of conduct—qualities which have made it a pleasure to us to work under your direction, and have stimulated us to use our best exertions to help and prosper you. Some of the undersigned have been in your service during the whole of the time mentioned, and many for the greater part of it, and we can therefore address you with the more confidence and satisfaction, speaking from so long a personal experience of the qualities to which we have referred." Another opportunity for congratulation offered in June, 1881, when Sir James celebrated his second marriage. His first wife, the daughter of Mr. Joseph Cliff, of Wortley, had died in 1873, and he remained a widower until 1881, when he married his present wife, the daughter of Mr. E. Fisher Smith, of Dudley. Mr. Gladstone sent Sir James as a wedding present a complete copy of his works with an autograph dedication; and the Leeds Liberal Association honoured the event by the presentation of an address. This was signed by Mr. J. Barran, M.P., Mr. H. J. Gladstone, M.P., Mr. George Tatham, the Mayor, and thirty-six other members of the Executive Committee. After dwelling on political services this document continued:—"Though we address you more particularly as members of the Liberal party, we cannot forget the active part you have taken in so many important educational and philanthropic movements in Leeds, and the responsible position you hold in connection with the commerce and manufactures of the town, both as President of the Chamber of Commerce and as one of the largest employers of labour in the district. In all you have undertaken for the good of your fellow-townsmen, your labours have been such as to entitle you to their gratitude, irrespective of party, and to secure for you their sincere interest in your welfare and happiness."

It may be mentioned that Sir James was one of the first fifty gentlemen who joined the volunteer corps originally formed in Leeds in 1859, and that he was appointed to the rank of captain, remaining in the corps for twelve years, when he resigned in consequence of the pressure of business engagements.

From the foregoing it will be seen that from his early manhood to the present time, Sir James has, by an active, enlightened, and high-purposed business and public career, occupied a very distinguished place in the history of his native town, and achieved a still wider recognition as a political leader, as is perhaps most strikingly evidenced by the fact of his election to the position he now holds as president of the National Liberal Federation. Sir James is yet in the prime and vigour of life, and, much as he has achieved already as a public man, still greater distinction is anticipated for him in that direction in the future ;

although he is not one who can be accused of self-seeking aims or excess of ambition; his attitude, on many occasions when opportunity might have been taken advantage of for securing him a greater share of public attention, has been marked by a modest self-denial which only a really strong man could, under the circumstances, have exercised.

But it is in the two large iron-working establishments which they control, that we find the most active evidence of the achievements of the Kitsons, father and sons; it is there that we see in actual progress the operations by which they have not only acquired fame in the industrial world, but reaped no little of the substantial results which follow upon the realization of a successful business career. A short description of the two concerns will form a necessary complement to the interesting biographical details we have been enabled to give.

The Monk Bridge Ironworks are entitled to be mentioned first, because of the fact that they are devoted to the production of iron and steel, a considerable amount of which is worked up at the other establishment—the Airedale Foundry—into engines. The situation of the Monk Bridge works is highly favourable, being immediately contiguous to the several lines of the Great Northern, Midland, and North Eastern companies' railways, in connection with which they have a private line which intersects the works. They employ a couple of locomotives in bringing in and carrying out material. It should also be mentioned that the Leeds and Liverpool canal passes close by, so that, one way and another, the works are in direct communication with all parts of the kingdom. The iron produced at Monk Bridge is considered equal in point of quality to the famous Low Moor iron, the ore being obtained from the same bed and smelted with the same description of coal as theirs.

In the first instance, the ore is smelted in the usual way in the firm's blast furnaces in York Road, and then, in the shape of "pigs," the metal comes under the operation of the refineries, where it is melted with coke, the heat being intensified by a continuous blast. When it has been thoroughly melted, and consequently refined, the furnace is tapped and a stream of molten iron, to the extent of about 30 cwts., runs off into a large flat mould. As the shining, shimmering, dancing metal flows forth in a thick, golden stream, the impure dross rises like a scum to the surface, and, being the lightest, floats away, while the molten iron itself sinks into the mould and gradually is cooled down into a solid form, assuming the shape of a flat piece, from two to three inches in thickness, while in width it is about three feet, and in length some seven feet. The next experience the iron meets with is to be broken up into small pieces, which has the appearance of reducing it to a condition of uselessness. In the making of iron, however, they only destroy to reconstruct in a more perfect substance. So, the fragments of refined iron are carted away to the opposite extremity of the works, where the puddling furnaces are situated, and here a charge of about three and a quarter cwts. is put into each furnace, and after being re-melted and manipulated in its molten state by the puddler for the best part of an hour, is turned out in coagulated masses or balls, and sent off to the steam hammer close by. As the immense hammer descends in well-regulated thuds upon the "bloom," the earth all around is shaken with responsive tremblings, sparks fly in all directions, and those in the immediate vicinity of the operation have to shield themselves from danger beneath strong metal masks or behind iron barriers. The hammering goes on until the slabs are compressed into solid form, each slab weighing nearly a hundredweight. Thence they are taken to a smaller steam hammer, where they are broken and sampled out into three different qualities. At this point the metal comes under the inspection of the foreman, and, being approved, is passed forward to the gas furnaces.

Having been submitted now to Siemens' gas furnaces, where they have been re-melted by a fierce heat, the iron goes to another steam hammer and is welded into slabs of from 600 lbs. to 4,000 lbs. weight. In the mill in which these operations are performed there are five large steam hammers, four of which have heads each weighing six tons, while the head of the other is more ponderous still, and weighs eight tons. It is something wonderful to see these immense hammers pounding away with irregular strokes, each blow adjusted to meet the condition of the metal, the brawny-armed workmen struggling there in the burning heat, their faces streaming with perspiration, as they turn the fiery slabs over and over until they have been crushed to a proper consistency. But, even now, the metal has not done with the fire ; it has other ordeals to go through quite as trying. It must go to the plate mill, there to be re-heated and passed through rollers, and made into bars or plates for locomotive and other boilers, if required for that purpose. The rolls are driven by three large engines of 1,300 indicated horse-power. One of these engines is constructed on the compound principle, and works with a high-pressure cylinder at one end of the beam and a low-pressure cylinder at the other. Nor are these the only steam engines used in the Monk Bridge works. There are two others, each of 150 horse-power ; and of smaller engines there are no fewer than thirty, varying from four to thirty horse-power each. The steam necessary for this large number of engines is generated in thirty boilers, representing nearly 1,000 nominal horse-power. There are fourteen steam-hammers, varying in weight from 6 cwts. to 15 tons. The latter weight is that of the largest hammer ; besides this, there are two of eight tons each, six of six tons each, one of three-and-a-half tons, and others of two-and-a-half tons. When the visitor, unaccustomed to the sights and sounds of a gigantic iron foundry, finds himself in the midst of a place like the Monk Bridge works, the clangour and the hubbub, the incessant noise of escaping steam, and the presence everywhere of smoke and flame, are apt to make him, at first, not a little alarmed for his safety; but, by-and-by, as he sees the hundreds of grimy toilers working away in the thick of it, unconscious of any danger, he is reassured, and carries on his investigations in comparative fearlessness. Not less threatening of aspect than the steam-engines and steam-hammers are the immense hydraulic cranes which throw their massive arms across the various workshops, and, under the guidance of experienced hands, exert their strength in lifting heavy loads of iron from place to place, with an ease and a dexterity that are very remarkable. A couple of large pumping engines are required to feed the cranes. The scene is one of great animation, and not devoid of a certain weird picturesqueness which generally accompanies the occupations in which the "fiery element" plays the most important part.

At Monk Bridge two distinct systems of economising heat are to be seen in operation. "Waste not, want not," is a proverb capable of application even in an iron foundry. The escape steam from the steam-hammers, instead of being allowed to dissipate itself uselessly in the air, is collected and conducted through a large pipe to three of Berryman's super-heaters, where the water for the boilers is heated almost to boiling point by the exhaust steam passing between the tubes. The admission of water thus heated into the boilers saves fuel and allows steam to be generated more quickly. So far as to one method of heat preservation. The second system finds its agent in Green's Economiser, an apparatus which is placed in close contiguity to the base of the chimney-stack. This contains a number of tubes, through which the water for the boilers passes, but here, instead of waste steam being collected, it is the waste heat from the hand-fired boilers. The heat thus arrested passes between the tubes and heats the water as hot as in the other case—to the verge of boiling. Steam supplies the motive power to the engines and machinery, while gas is retained as the chief giver-forth of heat. A long row of twenty of Siemens' producers may be seen alongside the Great Northern railway viaduct, which borders one portion of the works. Here is generated the heat for the numerous furnaces. The gas is drawn from the producers to the furnaces by means of the draught from the chimney, and the due proportion of air being permitted to intermingle, a fierce power of combustion is insured which soon brings the metal to a white heat.

The iron used for the making of tires and plates has its strength and durability thoroughly tested before conversion into the requisite shape. There is an apparatus which throws upon the iron a weight of half a ton or a ton, as may be desired, and tires and axles of the best Yorkshire iron and steel are expected to double up without fracturing. After that they are submitted to a further ordeal of strength, being taken to what is called the testing house, where they are subjected to a tensile strain of 24 tons to the square inch. Every single axle is tested in this manner, and one out of every fifty tires. Steel is tested also, a small piece of each make being subjected to the action of the testing machine at a given pressure, by which means either its comparative elongation or its reduction in diameter can be ascertained.

Within the last year or two steel making, in its more improved system, has been included in the operations of the Monk Bridge works. There is a large furnace of the Siemens-Martin pattern always active. Formerly, the steel used by Messrs. Kitson for tires was made in crucibles. Six Wilson gas-producers supply the heat for the furnace. From the producers the gas passes through the Siemens' Regenerator, where the air and gas are heated to a very high degree, prior to their union and combustion in the furnace amongst the ore. The ore used for this process is brought from Spain, being analyzed before use to ascertain what proportions of carbon and phosphorus it presents. The furnace is charged each time with ten tons of metal, ore, &c., and the process of melting and assimilation occupies, on an average, nearly half a day. When the molten metal is ready for tapping, small trial portions are taken out in a ladle, cooled, and broken, in order to ascertain the quality, and these being satisfactory, the operation is proceeded with. Behind the furnace the level of the ground is considerably lower than the front portion. On that lower level, immediately opposite the aperture from which the liquid metal runs, is a hydraulic ram, with two arms, one of which is heavily loaded to balance a huge iron bowl or ladle, and into this the molten steel is run. The ram and table turn on a centre, so that when the huge ladle is full of metal it can be turned and adjusted so as to come in succession over a number of moulds placed beneath. The ladle, which is in reality a gigantic circular iron pot, is kept red-hot by means of a large jet of gas mixed with atmospheric air. This prevents the steel cooling and sticking when it runs into the ladle. When the ladle is full, the combined weight of ram, table and ladle is not far short of forty-five tons. When the steel in the furnace is ready for tapping, the red-hot ladle is placed in position at the mouth of the outlet, and a workman breaks away the sand and clay with which the orifice of the furnace is choked. When this duty has been performed, the glowing white stream of metal streams forth into the ladle, throwing around thousands of brilliant, flaming bits of metal. As the ladle fills, another workman shovels into it a quantity of manganese, which is quickly absorbed by the molten mass. The slag can be seen thickening and bubbling at the top, until the stream of pure metal becomes exhausted and nothing but slag is emitted. Then the ladle is turned aside by the aid of the hydraulic apparatus, and the slag runs off into a hole in the ground, where it remains until it cools, and is then dug out. Two men are stationed on the top of the table, and, by means of a lever, the ladle is tilted over the ingot moulds beneath. What is termed a "swan's-neck" forms part of the ladle, and is in the shape of a rod that bends over the side. That portion of it which is inside the ladle is surrounded by circular fire-bricks, inside of which is a packing of sand. This protects the metal rod from melting. A workman applies a lever to the end of the "swan's-neck" which projects over the side of the ladle, the rod is lifted up, a value in the bottom opens, and out of that the white-hot steel runs off into the moulds. As one is filled, the table is moved round to bring the ladle over the next. and so on until the metal has been completely emptied. The moulds are then coated over with sand and battened down, to keep the metal from boiling over, and in about three hours' time the metal has cooled down, and can be taken out in the solid form into which the moulds have shaped it. When taken from the moulds the ingots of steel are cut into pieces of the required weight for the various tires. These pieces are heated then hammered into a rough circular form by a 15-ton hammer, and after that, have a large hole, punched in the centre. They are now heated once more, and worked on the anvil of a 7-ton hammer to an approximation to the shape required. This done, the tires are again heated, and finally, roiled and finished off.

It is exceedingly interesting to follow these various processes of the iron and steel manufacture as they are to be seen in operation at Monk Bridge, where all the assistance that modern invention has been able to give to those processes, and all that competent management has been capable of achieving in rendering them easy of accomplishment, have combined to make these ironworks amongst the most notable of industrial establishments of the district.

Messrs. Kitson's other concern, however—the Airedale Foundry—is much larger in extent than the works at Monk Bridge, and affords employment to a greater number of persons, nearly 1,500 workmen being engaged there on an average. The Airedale Foundry is situated at Hunslet, another of the work-a-day portions of the borough of Leeds, and is some three-quarters of a mile distant from Monk Bridge. There was a time when Hunslet was a pleasant rural village, with a manor house and all the other evidences of old English rusticity about it, but its aspect to-day is very different from that which it wore when Robert de Montgomery had it allotted to him by the Conqueror as a reward for his services, or when, at a later period, the Gascoignes and the Nevilles had seats there. Rural signs have long since disappeared from this part of the town, and it has now little to show that does not speak of the earnestness and energy of labour. It is a rather grimy region, even on the sunniest of days, for foundries, factories, and workshops go on with their smoke-spreading operations, day in and day out, let the weather be what it may. Still, it is not a spot that is likely to depress one's spirits; there is such an appearance of active and vigorous life on every hand that the impression conveyed is animating. There is much in this varied world of ours that is capable of affording gratification and engendering mental activity besides babbling brooks, flowery meads, mountain peaks, and other rural fascinations so dear to the heart of the poet; and the Airedale Foundry is an instance in point. The entrance to it is through an imposing pile of offices which have not yet been in existence long enough to have had their smooth, unwrinkled fronts defaced by smoke. These offices abut upon the main thoroughfare, along which a double tram-line runs, and with their two-storeyed range of rooms and spacious hall, constitute a convenient vantage ground for the small army of clerks whose pens the firm employ in conducting their book-keeping and correspondence. In these rooms they can sit unseen of the foundrymen, and pursue their duties with as much quietude as if their surroundings suggested nothing but calmness, repose, and serenity; but, for all that, the noise of the engines and the hammers continues all day long; the stranger within their gates can hear it distinctly enough if they cannot; but with them the case is different, they have become so accustomed to the clangour that its cessation would be a disturbance rather than a consolation to them. Going forward to what may be called the "drawing" rooms, we find ourselves still more sensible of the noises within, but as yet are not in the actual presence of the noise-producing agencies. Some twenty draughtsmen are seen at work drawing models on paper for the men in the foundry to work from, one room being devoted to locomotive and the other to stationary models. From here it is but a step to the wood-model shop, where a number of joiners are busily employed building up and constructing models in wood after the sketches of the draughtsmen. This shop is of considerable dimensions, and two storeys in height, the upper floor being visible from the lower through a large opening in the middle. The foreman's office is close to this opening, but on an intermediate level, so that the official, as he sits in his windowed office commands a full view of both floors. The men employed in this model-constructing department have a good deal of skilled work to perform, many of the models being of a very complex nature, requiring to be built up in separate pieces so as to guard against the danger of contraction. Some of the models are of immense size, reminding one more of the heavier pieces of domestic furniture than models. Steam saws and other usual accessories of a well-appointed joiners' shop are all to be met with here, and the workers in wood that one sees are naturally a great contrast in point of cleanliness of appearance to the workers in iron to be seen in the interior.

Leaving this part of the works and passing over to the foundry itself, we immediately become concious of a series of gigantic operations, and concious too that iron is the material which is being manipulated. Sounds of hammers—hand and steam—din in your ears with a tumultuousness that is almost alarming; and the roaring of many fires, the rumbling of many engines, and the clatter of things metallic here, there, and everywhere, all conduce to render the scene one of unceasing commotion. The main foundry is 300 feet long, and of proportionate width and height. It is divided into two parts, practically, though there is no wall or barrier to mark the line of division. One portion is devoted to the heavy work, the other to the lighter. Several furnaces are to be seen fiercely engaged in the production of molten iron, as fast as their construction will admit of their doing, and under much the same conditions as at the Monk Bridge works, the difference being that here it is for the casting processes connected with the making of parts of engines that the molten metal is being produced, and not the mere making of iron or the shaping of tires or axles. A score or two of grimy-faced workmen, their arms bare to the shoulder and their heads uncovered, are moving to and fro in the dusky, smoke-charged atmosphere, some of them delving amongst the sand and loam, carving out form and shape according to the wooden models they have had given them to work from, others with gigantic pokers, tongs and rakes, dashing away at the contents of the roaring furnaces, or seeing to the emptying and safe passage of the white hot liquid. In this large foundry mouldings of all sizes and shapes are being made, ranging from small cylindrical objects, over which the moulder expends as much care and pains as if he were a sculptor at work upon some tender piece of statuary, to immense steam-hammer heads weighing twenty-three or twenty-four tons. It may be that the visitor is fortunate enough to be present when one of these colossal tools is about to be cast. If so, he will be the spectator of a memorable scene. Two of the large furnaces will have been occupied for fully six hours previously, roasting, boiling, and melting into golden liquid some twenty-eight or thirty tons of iron between them. The feeding of these furnaces—an operation which is performed outside the foundry—is a matter of the utmost moment and requires the nicest adjustment. First of all, the proper quantities and qualities of "pig" iron, which lies about the yard in immense stacks, are collected, measured, and weighed, and cast into the roaring flames, and there for the space of six hours it continues until heated and dissolved into the liquid state. Meanwhile preparations on a commensurate scale are being made within the foundry for the important business of tapping. In the middle of the floor the model of a huge hammer head has been shaped out with the most elaborate care, there appearing to be as many cross pieces and supports as if it were intended for the model of a large public building. Two or three cranes of great strength, most formidable to look upon, are hanging like Brobdingnagian fishing rods overhead, the larger of the three being a steam crane, which is worked by means of a little engine that occupies an elevated position against the wall. This engine is in charge of a workman who has to keep a careful look out for the foreman's signal from time to time as to where he shall steer the long projecting arm of the crane. The positions of the two men correspond with those of the captain of a vessel and the man at the wheel. A strong force of foundrymen gather round as the time approaches for running off the contents of the two furnaces, and when the foreman gives the sign for action, the steam crane lets go its immense chain, down to the ground nearly, and this is hooked on to the large iron vessel, technically termed a ladle, which it immediately lifts and carries to the mouth of the first furnace. All eyes are now turned in this direction, and a powerful contingent of workmen gather round in readiness to take their allotted parts in the carrying out of the important operation. Then the furnace is tapped, and out rushes the molten metal in a thick, glowing, fiery stream into the ladle, flowing with an evenness and a smoothness that suggests milk rather than metal, were it not for the dazzling bits of rebellious fire that it throws off in its progress into the red-hot receptacle. This goes steadily on, a hundred anxious eyes watching it all the time, and when at last the ladle has received into its capacious cavity about twelve tons weight of the liquid iron, the flow is temporarily checked, and the huge panful of boiling metal is lifted away to the side of the model into which it is destined presently to be emptied. A second ladle is then filled in the same manner, to the weight of perhaps ten tons; and then a third, of somewhat smaller capacity, is called upon to bear its share of the responsibility of holding the metal. There are now three ladles full of fiery liquid, and, by the aid of the cranes, and the assistance of twenty or thirty pairs of stalwart arms, whose utmost powers are required to be exerted in the guidance of these ponderous swinging vessels, the pans are lifted to their places beside the model. And now, as the three ladles rest in their separate positions at the mouths of three openings in the mould, it is presumed that nothing remains to be done but to tilt the vessels to the required angle and let the three streams flow in and mingle; but, on the top of the contents of the first-filled ladle an incrustation has been formed, while it has been waiting, and this has to be broken and skimmed off with those tremendous pokers and rakes of which previous mention has been made. This is a work that is very trying to the men, for the heat is scorching and the necessity for quick and dexterous action paramount; every single second's delay makes matters worse. It is not long before the blackened crust has been cleared away and buried in the sand, and then the tilting process can be performed with safety. The foreman now picks up an instrument that is red-hot at one end, applies it to a number of bundles of shavings that have been spread over the different parts of the model, and these take fire and consume the various gases that are emitted during the progress of the moulding. Then he jumps upon a plank that rests above the mould and gives the signal for the three ladles to be simultaneously tilted. The moment is one of breathless interest. The beautiful fiery liquid is emptied into the three mouths of the model in three immense streams, the shavings blaze, the gaseous fires flicker about the surface of the mould and around the grim form of the foreman, and in one or two places the flames splutter forth in a manner that seems to be positively threatening. Altogether, the scene is impressive in the extreme, full of incident and excitement, and recalling pictures of demoniacal grandeur and wierdness. Still, there is no confusion, no alarm, no aimless running to and fro: every man knows just what to do and when to do it; and the skilful guidance of the foreman regulates each movement until the operation is brought to a successful finish. The three streams of metal continue to flow, the men, with their ponderous tools, keeping the ladles all through at their proper elevations, but, by-and-by the molten metal is seen to rise out of the mould and empty itself into an overflow channel that has been prepared; it is then known that the mould is completely filled; the three streams are immediately stopped by the restoration of the ladles to their perpendicular, and the casting is left to cool and congeal into massive solidity at its leisure. The making of a twenty-five or a thirty ton casting is not an every-day occurrence, however, even in a large establishment like the Airedale Foundry, so that the visitor who happens to time his arrival so that he may witness an operation of the kind has reason to consider himself fortunate, for he will have looked upon a scene that will always remain vividly impressed upon his memory. Such scenes are more calculated to give one an idea of the marvellous power which man exercises over the elements and forces of nature than volumes of reading would do. It is a realization of the ancient adage that sets a grain of practice before a bushel of theory.

In another part of the foundry the operations of loam or dry sand casting is in progress, and it is well worth while watching the men at work in this portion of the establishment, to notice with what infinate skill they construct their models, building them bit by bit into the required form, and afterwards placing them in front of huge fires where they are gradually baked until quite hard. Then there is the brass foundry, where several furnaces are kept constantly going. The brass-finishing shop, and the coppersmiths' shop have also to be visited. The amount of copper used in the construction of locomotives is very considerable. In the store-rooms here are to be seen many thousands of pounds' worth of this valuable metal, in rod and sheet form. The boiler department is an interesting spot in which to while away an hour, and might be written upon to a great extent if all the objects of interest to be found there were to be noticed. For noise, the boiler-house carries off the palm, the din caused by the incessant hammerinn away at the iron plates being something deafening. The end plates of the locomotive boilers are quite striking in their appearance, their faces full of holes and all in readiness for the ornamentation of brass and steel work with which, when in their finished condition, they are made to look so business-like and imposing.

In the wrought iron department there is another busy and picturesque scene presented. There is the smithy, with its eighty fires or hearths, in rows down each side of the building, with a large open space between. Here the smiths are at work beating the hot iron into shape upon their anvils with all the strength and vigour of their bodies. "Ring, ding, ding," go the hammers, the sparks flying hither and thither at every stroke. The operations are very different from those carried on in the ordinary wayside village smithy, of which we have read so much in song and fiction. A hundred village smithies thrown into one would be required to make up an equal amount of hammering and ding-donging to that which can be heard in this one smithy belonging to the Airedale Foundry. For the heavier work there are small steam-hammers, which are found to be of great utility. The wheel-making processes in this part of the works are manifold and intricate. To begin with, the wheel is built up in separate segments and enclosed in a rim; then the different pieces are taken and welded together, the gaps are closed in all round, two huge "washers" are welded at the axis, and finally the whole structure is welded to its tire. Selected scrap iron only is used for these wheels, which require to be stronger and firmer than the wheels of the ordinary railway coach.

There are many other portions of the works that we might make particular reference to if the space were at our command. A very brief mention of the remaining departments, however, must suffice. There is the heavy turning shop, where a regular procession of wheels on axles can be seen, and buffer plates undergoing the boring operation five or six at a time; there is the punching and plate-bending shop, where a machine, worked by its own special engine, is punching holes an inch and a quarter in diameter in sheet iron an inch and a eighth in thickness; and there is the machine shop, which is almost exclusively devoted to the making of nuts and bolts, a large number of men being employed here, as may readily be understood when we attempt to realize the fact that there are from 400 to 500 different kinds of these useful appliances used in the construction of a single locomotive.

The fitting shop is a large workroom, over 200 feet in length, and crowded with machinery, to run which several miles' length of belting is required. There are four or five rows of machines stretching the entire length of the shop. One side is taken up with lathes of various kinds, the machines comprising all the different descriptions of planing, drilling, slotting, and kindred machines, all of them being in full and active operation. This is one of the busiest places in the whole foundry, and is managed with an amount of precision that insures the best possible fulfilment of the work intrusted to it. There is a foreman, who has the general management and control of the department in his hands, and under him are placed a number of what are called "leading hands," who are furnished with drawings of the pieces of machinery required to be fitted, and who mark out for the workmen what special work their several machines are to perform. In this way an effective supervision is maintained throughout. Finally, we come to the erecting shop, where the various pieces made in other parts of the works are brought together for the purpose of being built up into the form of perfect machines. This shop—which is necessarily on the ground floor—is 250 feet long, and affords space for the erection of twelve locomotives at the same time. Here can be seen these mighty representatives of steam power in various stages of completion; some with the mere foundations of their structure laid down, others with all their complex parts joined together in perfect harmony, and looking bright, beautiful, and massive as they stand there ready to be fixed up and sent out upon their railway wanderings no one knows where. One is greatly struck with the fact that the locomotive in its skeleton form, as it is to be seen in Messrs. Kitson's erecting shop, seems very much larger than when on the railway.

The Airedale Foundry covers altogether an area of over ten acres, and is one of the best arranged establishments of its kind in the country, the several processes of engine-construction being there to be seen in operation under the most favourable conditions. Messrs. Kitson supply locomotives for most of the leading railway lines of the kingdom, and from the first formation of their works to the present time have made steady and rapid progress year by year, their foundries to-day being amongst the best known in the North of England.

In their relations with their work-people, Messrs. Kitson have always been fortunate. They have shown the greatest consideration for the welfare of those by whom they have been served, and have never been wanting in promoting any movement that would tend to their social advancement. As an instance of their liberal-mindedness, it may not be out of place to refer to a circumstance which occurred at their foundry a little while ago during the time when the Leeds Church Mission was engaged in conducting special religious services amongst the working-classes of the town. On that occasion Messrs. Kitson permitted the mission workers to hold a service in the foundry, when the bishop of the diocese attended, and addressed an earnest and impressive discourse to several hundred workmen. The sight was one to be long remembered, for its contrasts and incongruities, if for nothing else. The long, gloomy, smoke-hued room—with the heavy rafters of its roof weighed down by blackness and dust, the floor strewn with blocks of iron, half-finished boilers, pumps, engines, and other iron-work—seemed resting yet in strange unrest. At one end a rough temporary wooden platform had been erected, the newness of which appeared all the more glaring because of the desk draped in red cloth, which stood upon it. This did duty for a pulpit, and when the venerable dignitary took his place there, his sturdy, commanding figure arrayed in spotless black, and his gold chain, gold-rimmed eye-glasses, and gold signet ring all well in view, he must have been regarded with curious feelings by the men who sat there in front of him, in their dirt and grime, with the evidences of their toil around them, and listened to his address. One or two of the lesser luminaries of the church took their places near his lordship, and one of the junior members of the firm stood quietly within the shadow near the platform. The manager of the works stood between a pair of girders, with a hymn book in his hand, and the men scattered themselves about here and there, some standing, some sitting, some with their hats on, some with them off. When the hymn was sung by which the service was opened, many of the men joined in, and the sacred strains sounded more like the demon chorus in a stage performance than anything else, with the noise and hum, and clangour of the engines and the machinery breaking in upon the music. Still, the majority of the men seemed to appreciate it all, there being few to scoff or jest. When the bishop spoke to them he was so much in earnest that he rivetted their attention, and evidently gained their approval, which was something to be proud of, considering the circumstances, which were very exceptional, and the tendency there is on the part of the working community to resent anything that can be construed into an interference with their freedom of action or thought. But they listened intently, from time to time wiping their dirty faces with their still dirtier hands, or fingering their clothes uneasily, as if rather ashamed of appearing in their rough working garments in the presence of such a well-dressed and orderly-looking gentleman. The bishop delivered a vigorous speech, full of plain homely truths and couched in simple language. He did not touch upon matters of creed or doctrine, nor did he exalt his own church to the disparagement of any other; he merely gave utterance to the broad sentiments of Christian charity, urged the men to acts of religious duty, and set before them the solid advantages to be reaped by following a good, honourable, and upright life. It was a brief service, but an effective one, and probably made all the deeper impression upon the men by reason of its being given amidst the scene of their daily toil.

Mr. J. Hawthorn Kitson, the younger brother of Sir James Kitson, has had the general management of the Airedale Foundry under his charge for many years. He is a graduate of the University of London, and is a practical locomotive engineer, having served his time in the shops at Airedale Foundry. For the last five years he has been assisted by the Hon. R. C. Parsons (now a partner in the firm of Kitson & Co.), son of Lord Rosse, of astronomic fame; and, having in view the further development of the business, Mr. T. P. Reay, the general superintendent of the works, has recently been taken into partnership.

Messrs. Kitson, it will be seen, have done so much to promote the business interests of the Yorkshire metropolis that it was only natural they should receive the grateful recognition of their townspeople for the good they have done in this direction. By their enterprise they have succeeded in building up an industrial concern which adds considerably to the wealth of the town. The £150,000 a year or more that they pay in wages provides comfort and happiness for hundreds of working families; and their trade is of such a special character that, often when other branches of industry are depressed, they are in full employment. The recognition that Leeds gives the firm is to press such local public honours upon its members as they are willing to accept, and seeing that in the present head of the firm they possess a gentleman of great natural capacity for public work, the connection between the town and the name of Kitson promises to be of a lasting and distinguished kind.

THE RICHARDSONS OF BESSBROOK.

THE RICHARDSONS OF BESSBROOK.

SO much is heard of the unhappy side of Irish life that the untravelled Englishman is apt to regard the Sister Isle as a wilderness of want and discontent. There is a brighter side to the picture, however, and this is to be found in the province of Ulster, where, thanks to the growth and development of manufactures, the impress of prosperity and progress is visibly set upon the landscape. Ulster is the home of the flax plant, the grateful blue blossoms of which give such delight to the summer fields, affording a pleasant relief to the many acres of meadows carpeted with the snow-white linens which the factories have produced from this same plant. The manufacture of flax belongs almost to the beginning of things in Ireland, its introduction into the country being anterior to the period of historical record. There is record, however, and more than is altogether agreeable to read, of the many attempts which were made to curb or destroy this industry in the days when Ireland was governed solely in the interests of England, and without the least consideration for the welfare of the Irish people. That there have been such times in the past not even the bitterest opponent of recent legislative attempts to conciliate Ireland would think of denying. The first English representative to manifest any real sympathy with local enterprise, so far as the Irish linen trade was concerned, was Thomas Wentworth, Earl Strafford, who, when acting as the Viceroy of Charles I., adopted measures for the improvement of the cultivation of the flax plant. His predecessor, Sir Arthur Chichester, had boasted in his despatches to his royal master at Whitehall that he had laid waste the country from Carrickfergus to Cookstown, and destroyed all the rebels' corn, imagining, in his vain-glory, that this was the only way of upholding the honour of the British flag. Dublin Castle had a very different occupant in Lord Strafford, who, from the first, saw the wisdom of encouraging the industrial arts amongst the people. The Viceroy made a tour through Ulster in the summer of 1637. This trip was fruitful of observation and beneficial in its results. Lord Strafford was attracted by the abundance of wild flax which he saw growing along the hill-sides near Ballycastle, and was not long in coming to the conclusion that under favourable cultivation the yielding powers of the soil might be greatly improved. With the view of putting his ideas to the best possible test he had a cargo of seed imported from Holland, and got over several experienced Dutch farmers to superintend and instruct the native cultivators in the art of growing the plant. The result was most gratifying, the next year's crop being a hundred times larger in quantity than the previous yield, while in quality it was greatly superior to any that had theretofore been raised in the country. In this, as in other things, the Lord Deputy was "thorough," and in promoting the linen manufacture of Ireland spent in one year £10,000 of his own private fortune. At his own cost he had a hundred of the best linen looms brought over from Amsterdam, and these were distributed amongst the most worthy of the Irish weavers. Unpleasantness arose between the natives and the foreigners, the former being jealous of the latter in many instances, and unwilling to be taught by them; but Lord Strafford brought his influence to bear, and peace was ultimately restored, compensation being awarded to such as suffered loss from outrage.

While doing all in his power to advance the interests of the Irish linen trade, however, Lord Strafford was not unmindful of the trading interests of England, which he had been specially instructed to bear in view. The woollen manufacturers of Yorkshire were sore afraid that Ireland would prove a sturdy competitor with them, and, on their representations, the new Viceroy was ordered to spare no effort to keep down these manufactures in the country over which he had charge. Ireland was making great advances as a wool-growing country, and it was but natural that it should also wish to have a share of the more remunerative business connected with its manipulation. But the English clothiers would not hear of this; they would buy the Irish wool and work it up into fabrics themselves, but beyond this would yield no concession whatever. Free Trade principles were altogether unknown in those days; each trading community did its best to conserve its own privileges, and prevented, as far as possible, any rival community acquiring equal rights. So, while Lord Deputy Strafford served Ireland as far as he could in encouraging the linen manufactures, in which England took but little part, he did not fail to mention in his despatches that he was careful to protect the English clothmakers from Irish rivalry. On the 25th of July, 1636, he wrote as follows to the King and Council: "I have taken good care to discourage all I could the clothing trade, in regard that it would trench on the manufactures of England, for if the Irish should make their own wools, which they grow in great quantities, it would trench on the trade in England, and it might be feared they would beat us out of the market by underselling us, which they are well able to do. I have, however, set them to work in another way, that is, by improving the make of linen cloth; and as the women are all naturally bred to spinning, and the earth is apt for the bearing of flax, I will encourage the trade, which would be rather a benefit than otherwise to England." This was the policy which the ill-fated Strafford believed in, and which he faithfully strove to carry out; and thus the linen trade of Ulster came to be a powerful factor in the sum of Irish industry, and had the foundations of its prosperity substantially laid. Nor was this all that Lord Strafford did for this part of the island. He gave the first impetus to the shipping trade of the port of Belfast by purchasing from the corporation of Carrickfergus the prescriptive right of importing foreign products at one-third the amount of customs levied at other places of landing, and handed the same over to John Walker, to be held by him and his successors for the benefit of the town.

But the linen trade was the only industry that was given a chance in Ireland. Even Protestant King William, with all his professions of affection towards conquered Ireland, could not be got to look with favour upon the Irish woollen trade. The merchants and manufacturers of Bristol and Yorkshire represented to him, as their predecessors had done to the Stuarts, that this was the one thing to be crushed at all cost. When waited upon in regard to the matter William said: "Gentlemen, I shall do all in my power to promote the trade of England and to discourage the woollen manufactures of Ireland." Acts of Parliament were passed in fulfilment of this promise, and not only the woollen trade of Ireland but its shipping industry was placed under a ban.

The people of Ulster did not neglect the opportunities which were opened up to them, however, by the development of the linen trade, but year by year extended their operations, and were fortunate enough to secure the sympathy and assistance of the landed proprietors. During the period of the Civil War there was not much solid progress made, but after the Restoration the linen manufacture looked up, and from 1711 down to 1832 was placed under Government patronage. But the coming over from France of a number of Huguenot refugees, banished by the persecutions of Louis XIV., tended perhaps more than all else to establish the linen industry of Ulster on a firm foundation. The Belfast Board of Traders placed it on the records of their institution, in 1712, that "Louis Crommelin and the Huguenot colony had been greatly instrumental in improving and propagating the flaxen manufacture in the north of this kingdom, and the perfection to which the same is brought in that part of the country has been greatly owing to the skill and industry of the said Crommelin." Other illustrious Huguenot names in connection with the Irish linen trade are those of the Goyers and the Duprés. But it was Louis Crommelin who made the chief mark among them, and by his high character and example showed how noble a thing industry was when rightly followed. A local historian, in paying a tribute to the memory of this famous pioneer, says: "The dignity which that enterprising man imparted to labour, and the halo which his example cast around physical exertion, had the best effect in raising the tone of popular feeling, as well among the patricians as among the peasants of the north of Ireland. This love of industry did much to break down the national prejudice in favour of idleness, and cast doubts on the social orthodoxy of the idea then so popular with the squirearchy that those alone who were able to live without employment had any rightful claim to the distinctive title of gentleman."

A change now came over the spirit of the dream, and the occupation of the linen weaver grew to be one of honour, and was attended by special privileges. The weaver was exempted from service on juries, and absolved from being forced into the army, except under very special circumstances. We are told that many of the old Irish squires, as well as the sons of landed chiefs, were taught to weave; and even as late as the present century there were numbers of such weavers in Ulster. With examples like these before them constantly, it would indeed have been strange if the lower classes had not shown themselves sensible of the importance of this industry. It was the custom of Lord Moira, during his long residence at Montalto, to give a dinner every Thursday for the cloth buyers who attended Ballynahinch market. His lordship used to preside at these dinners, and would listen to the trade gossip with as much interest as if he had been himself a dealer in linen. The Earl of Hillsborough and Lord Hertford exerted their influence also to the advantage of the Ulster trade. The latter, in 1765, when he filled the post of Irish Viceroy, obtained from the Linen Board many valuable concessions in favour of the merchants of the northern province, and was successful in procuring royal patronage for the Lisburn damask works. When once the favour of the Court had been bestowed upon the Irish damasks they speedily became in greater general demand. The royal table was covered with the best samples of these attractive goods, and the admiration they called forth resulted in extensive orders being sent from the leading aristocratic houses of the kingdom. Continental royalty likewise patronised the Lisburn damasks, and, one way and another, fame and profit accrued to the Irish manufacturers.

Something more than mere patronage was required, however, to build up a prosperous industry. Unless the highest mechanical efficiency could be associated with the commercial enterprise of the people it would be impossible for the fabrics of Ulster to maintain their ground with the linens of the Continent. As a matter of fact, the looms of Holland were superior to those of Ireland, for many improvements had been made in the construction of these machines since the bringing over of those hundred looms from Amsterdam by Lord Strafford. As far as regarded the production of ordinary goods the Ulster manufacturers were well able to hold their own, but when it came to the weaving of fancy patterns they had to confess themselves very much behind their foreign competitors.

This was the condition of affairs in the Irish linen trade when two men came forward, James Quinn and James Bradshaw, and devoted their energies and talents to the bettering of these matters. Quinn introduced an extensive change of patterns, in which many beautiful designs were wrought out on the Lurgan damask looms, doing much to help the development of a higher taste among the damask weavers of Ulster. Bradshaw had his attention more particularly directed towards the diaper trade. He was the son of an independent landowner living in the neighbourhood of Newtownards, and had many opportunities of comparing the work that came from foreign looms with that which was produced in Ireland. It was humiliating to him as an Irishman and a patriot to have to admit that the Ulster product was wanting in some of the elements of attraction which were present in the Dutch fabrics. He mastered all the details of weaving machinery, and in doing so became aware of its more serious defects, although he did not possess sufficient of the inventive genius to be able to remedy them. Under these circumstances he concluded that the best thing he could do would be to master in some way the existing superiority of the Dutch looms.

To this end, one morning in 1728, he left his home in Ulster, and assuming the dress of an ordinary weaver, set out for Holland. Travelling facilities were but few at that period, so his progress in that direction was only slow. After journeying for several weeks, he found himself in Hamburg, where the diaper manufacture was carried on extensively as well as in Holland. He soon saw that there was as much knowledge to be picked up amongst the Germans as amongst the Dutch, and before long he obtained employment with one of the leading manufacturers in the city, neither his master nor his fellow-workmen imagining that he was anything more than a common weaver. Indeed, Bradshaw knew that if his plans were discovered he would soon be visited by summary vengeance; so for two years he continued his labour of love amongst the Hamburg weavers, living as they lived, and working as they worked, but observing everything, and completely acquainting himself with all the details of the construction of the looms. No department of the manufacture escaped his searching eye ; not only did he master the various mechanical features, but noticed all that was done in regard to the selection of yarns and the arrangements of styles. His earnings barely sufficed to keep him in food and clothes, but he made no demand upon those at home until at the end of two years, when he thought he had gained all the information he could. He then decided to return to Ireland, and wrote to his friends for money, which they readily forwarded. Arriving at Newtownards in 1730, he at once set about the building of looms on the plan of those at Hamburg, personally superintending their construction, and having them made in every particular on the Hamburg system. By this move the diaper trade of Ulster was put on an equal footing with that of the Continent, and an impulse was given to the Irish linen industry which, with the efforts that were put forth on its behalf in other quarters, served to place it in the front position, from which it has never since receded.

A movement for the erection of a White Linen Hall was set on foot in 1778 in Belfast. The Earl of Donegall was applied to for a site, and granted part of a grazing field, at a nominal rent, on the condition that it should be used for ever afterwards for the purposes set forth in the application. It was not until 1782, however, that any further step was taken towards carrying forward the project, when a meeting of bleachers and linen merchants was held, at which a sum of close upon £1,800 was subscribed, and the Linen Hall, which still stands on the site granted by the Earl of Donegall, was shortly afterwards erected.

The Linen Board, which was established for the promotion and advancement of the Irish linen trade, received a grant from the Government of £20,000 a year. There was a Flax Society also, which had a grant from the Imperial Treasury. This State aid, however, has been long discontinued, and now the trade of which Belfast is the head-quarters, is altogether independent of aid of any kind except such as is furnished by its own enterprise and spirit. How far these qualities have carried this important industry may be gathered from the statistics which have been published. It is stated that in the province of Ulster there is not less than £50,000,000 invested in flax-spinning and power-loom weaving, three-fourths of that sum being credited to Belfast alone. There are over 20,000 looms and 900,000 spindles at work, giving direct employment to about 100,000 persons. The full capital embarked in the Ulster linen industry, estimating the sum required for the carrying on of the various operations as equal to that invested in mills, plant, &c., will amount to £100,000,000.

The linen trade of Ireland benefited, like the rest of the fabric-producing world, by the introduction of steam-power in the first half of the century; still, although the Ulster looms are of the most improved pattern, the hand-loom is yet largely employed in the production of the finer kinds of damasks, a better quality of piece being obtained from it than from the power-loom. The Ulster landscape is thickly planted with factories—their tall chimneys and many-windowed frontages telling of an industrial prosperity which is in marked contrast with the agricultural depression that forms so unwelcome a feature of other parts of the country. As for Belfast itself, the capital of the province, with its 250,000 inhabitants, its miles of streets, its handsome public buildings, its splendid warehouses, its scores of gigantic mills, and its extensive shipbuilding and engineering establishments, it is a vast industrial metropolis, combining the best elements of an English manufacturing town with the more agreeable features of Irish life and character. Belfast has produced many notable commercial leaders, whose abilities have been wisely divided between the promotion of their own individual enterprises and the advancement of the general good, and to-day can show as noble a roll of industrial names as almost any city in the empire. Amongst the firms which might be singled out for particular mention are firms like those of William Ewart and Sons, the York Street Flax Spinning Company, J. N. Richardson, Sons, and Owden, John S. Brown and Sons, and the famous Bessbrook Company, of which Mr. John Grubb Richardson was the founder. Mr. Richardson is, indeed, such a representative man in connection with the later developments of the Ulster linen trade, and the works in which he has for so many years taken an active and leading interest are so thoroughly representative of the trade itself, that we have thought well to make the Bessbrook undertaking the chief subject of our present article, although in doing that we are compelled to separate ourselves in point of geographical association to some extent from the linen metropolis.

Bessbrook is a manufacturing village about thirty miles distant from Belfast. It stands in a picturesque situation, close to the town of Newry, with a stretch of mountain scenery in the distance behind it, and a belt of green fields and woodland forming a sort of inner circle round it. The factory buildings, which are of a very extensive character, are of cut granite for the most part, and have an exceedingly substantial appearance. The principal mill consists of four stories, and both this and the other factories are remarkable for the loftiness and spaciousness of their rooms. Two tall chimneys stand forth like monumental towers far above the roofs of the mills, and disperse the smoke into the cloudland above, well away from the dwellings which form the model village of Bessbrook. Some idea of the extent of this industrial colony may be gathered from the fact that nearly 3,000 workpeople are employed at the place, and that the mills contain about 800 looms and 23,000 spindles. For the driving of this enormous weight of machinery six steam-engines, representing an indicated horse-power of upwards of 1,100, are required, entailing a consumption of 10,000 tons of coal per annum, which have to be brought from Newry. Turbine water-wheels of great power are likewise employed. There are also several workshops, where all necessary repairs are executed, a large staff of mechanics being constantly employed in this department. The Bessbrook works are connected with the port and town of Newry by an electric railway, constructed on a larger scale than any previously attempted. Ten mixed trains, for goods and passengers, run each way every day; the goods waggons are made so that they can be run at pleasure either on rail or road, by a novel and simple plan prepared and worked out by Mr. Henry Barcroft, a nephew of Mr. Richardson, and one of the managing directors.

The Bessbrook works were first established in 1847, and have a special interest, not only as an industrial, but as a social experiment. Mr. John

G. Richardson, a wealthy member of the Society of Friends, was the gentleman in whose intelligent brain the idea of the experiment was first conceived. The Bessbrook estate, the property of an Irish nobleman, was some years after in the market. It consisted of 6,000 acres, and both in regard to situation and extent exactly accorded with Mr. Richardson's requirements. Moreover, one portion of the estate yielded a blue granite of excellent quality, which not only provided material for building the factories, but has since been employed in the erection of many leading public institutions in England, the Manchester Town Hall amongst the number. Mr. Richardson had, to begin with, the co-operation of his brothers, Jonathan and William, who have since died, and the desire was to establish a model working village, in which the principles of sobriety, thrift and cleanliness should have favourable opportunities of development. The building of the works was a comparatively easy matter, for in that the founder had simply to imitate his manufacturer neighbours ; but the creation of a village which was to yield its builder a higher satisfaction than that of mere rent and profit was a very different matter. There was to be no public-house in Bessbrook, no pawn-shop, no policeman. It seemed altogether beyond the range of practical possibilities to expect to establish such an Utopia with nothing more stable to work upon than a community of Irish working people. The materials certainly did not promise well, but Mr. Richardson was as high in hope as he was in purpose, and resolved that at all events he would make the attempt. Within the shadow of the great factories he built a series of streets of substantial appearance, with two pretty squares, where shops and public institutions form a striking feature. Each house accommodates one family, and comprises from three to five rooms, according to the size of the family occupying it.

The institutions of the village include a town hall, a school, to which every householder has to send his children, a penny a week being charged for each child whether he attends the school or not; a dispensary, where a doctor is regularly in attendance; a library and news-room, where the leading papers are taken; and several chapels or meeting-houses, where the workpeople can perform their devotions according to their creeds. The firm subscribe £100 a year to the school, and also a handsome sum to the dispensary. There are shops to meet all the requirements of the people. To the north of the town is a farm of 300 acres, which the firm carry on for the benefit of the villagers, pure milk being thus assured (amongst other things) to the citizens of Bessbrook. A series of allotment gardens of large extent has been laid out on the outskirts of the village, the tenant of each house having a share apportioned to him. There is a "West End," too, at Bessbrook, a residential quarter where the gentlemen occupying managerial positions at the works live, and many have the benefit of the view of the artificial lake which serves to feed the mill. The Quaker meeting-house, in which the religion of the founder is quietly allowed to work its peaceful mission, is situated at the entrance to the town, and here Mr. Richardson and his family often worship with their workpeople in the unobtrusive fashion of their sect. Mr. Richardson's Bessbrook residence is in close contiguity to the meeting-house, and with its surroundings of beautiful shrubberies and ornamental grounds, gives to this part of the estate an exceeingly picturesque appearance. The River Camlough flows through these pretty groves, and, although only a small stream, serves for the water-supply of the mills of the district, and, widening into pleasant pools here and there, affords many attractive views, with the thick foliage of the trees hanging over its margin. The town altogether is full of life, beauty, and animation, and the traveller who makes it a halting-place on his journey from Belfast to Dublin will be well repaid for his trouble. He will find no drunken orgies at Bessbrook, no exhibitions of squalor and wretchedness such as are but too common in ordinary town life in Ireland, and no obstructions of law and order. Those who cannot exist without the gin-palace or the beer-house had better not fix their abode in this model colony, for although the firm do not insist upon their workpeople being total abstainers, many of them have found the benefit and comfort of subscribing to the principles of their industrial captain, and look with such disfavour upon the indulgers in intoxicants that he must indeed be a hardened offender who can face their scorn and comtempt for any length of time. The temptation to drink, however, is not in their midst, and it is hardly worth while making the journey to Newry, two and a half miles away, for the mere sake of getting intoxicated when the unsteady return home will be made the subject of the disparaging comment of one's neighbours. As far as has been possible, without undue interference with the liberty of the subject, or a too obtrusive exercise of the paternal system of local government, the people of Bessbrook have been kept aloof from evil influences, with the result that the town has one of the cleanest records of any place within the Queen's dominions. The social experiment has in every way been as satisfactory as the industrial experiment, and now, in his old age, Mr. Richardson is able to look back upon the idea of his early manhood as a problem solved and a fact accomplished. Many similar attempts have been made to realize industrial Utopias, but in no instance with greater success than at Bessbrook, which was started several years before the establishment of Saltaire, perhaps the most notable of the model colonies on English soil.

A tour of inspection through the Bessbrook works, with a brief description of the various processes of the linen manufacture as there carried on, will doubtless prove of some interest.

To begin at the outset of manipulation of the flax, we have to visit the warehouses in which the fibre is stored up just as it has come in from the various markets of the province, or from the Continental marts from which it has been imported. Here it is weighed and picked, after which it is passed forward to what is called the "roughing" department, where from eighty to a hundred men are employed in putting the flax through steel gills or upright wires set in a wooden bench. Long practice has made these men wonderfully expert in the handling of the fibre, which they pull through the dangerous-looking wires with great dexterity and skill. The flax is selected and arranged according to sample, it being of the utmost importance to the subsequent processes that as even and level a quality as possible should be put together in this department. In the hackling-room the fibre is submitted to a still further sorting and sampling. Here can be seen both machine and hand hackling. The machines used are what are known as Horner's patent, which perform all the operations of combing and cleaning automatically, except the changing of completed samples for those about to be acted upon. The work of changing is performed by boys, who look after the machines and keep them constantly supplied with fibre. There are over a hundred boys engaged in this department.

After having been subjected to the sorting and hackling processes, the flax is passed on to the preparing department, where machines of a more elaborate character carry on the work of manipulation, taking up the short pieces on an endless apron, and, after passing them through the necessary rollers and stretching appliances, delivering them into cans, from whence they are taken to the roving machines and wound upon bobbins. The preparing department, with its little army of female workers and its buzz and hum of machinery, presents a scene of great activity· The whole length of the large factory is exposed to the view and can be taken in at a glance. Most of the preparing machinery, it ought to be mentioned, is of home construction, having been supplied by Messrs. Combe, Barbour & Combe, the machine makers, of Belfast.

The remaining processes are very similar to those in the other textile manufactures. A writer on the "Industries of Ulster" gives the following description of these processes: "The spinning department is the one to which the prepared fibre is taken, and the rooms in which the spinning frames are fixed are alongside and above the preparing machinery, and present nearly the same busy scene. The yarns are now taken off in bobbins as delivered from the spinning frames, and suitably divided for warps and wefts, then wound upon frames, and made into hanks, taken to the drying-room, and after completion of this process they are bundled for use in the machinery which prepares them for the looms. This machinery is of an elaborate and complex nature, but works beautifully and smoothly. Without diagrams it would be difficult to give a conception of the 'bank' upon which the bobbins are ranged, and from which they deliver their yarn through perforated metal plates. The yarn is then led down into a straight line, and, passing through wire uprights, is delivered upon a roller in a kind of skeleton web. This again is unwound, and passes through another somewhat similar operation, while a bath of thickish paste is administered which is called 'dressing.' This is necessary for the subsequent weaving process, and has nothing to do with the final finish, as goods are woven generally in the unbleached state. The temperature of this dressing-room has to be maintained at about 120 degs., and the visitor emerges from it with warm reminiscences of the tepidarium of the Turkish bath."

The weaving sheds are fine, lofty and spacious rooms, and disclose a vast labyrinth of pulleys, belts, and complex mechanical contrivances, the looms keeping up an incessant rattle and clatter, as the weavers watch their lightning-like movements. Plain linens are produced in the weaving-rooms here and at Craigmore, about a mile away, but the firm have some two hundred looms employed in the weaving of the more delicate and richer descriptions of damasks, in the working out of whose designs the Jacquard machine is brought into operation, the adaption most generally in use being that known as the "Bessbrook."

As far as the processes of manufacture are concerned, the damask fabrics may at this stage be looked upon as complete, but they have still numerous finishing ordeals to go through before they are ready for the market. In the first place the woven pieces have to be submitted to the operation of bleaching, and for that purpose have for a time to part company with Bessbrook. They have not to travel far, however, nor have they to leave the charge altogether of the firm by whom they have been manufactured. They are sent to the bleaching and finishing works of Messrs. J. N. Richardson, Sons, and Owden, Limited, at Glenmore, near Lisburn, of which Mr John Grubb Richardson, the founder of Bessbrook, is the leading partner. We will take the liberty of following the linen cloth from the looms to this place, and watch through what additional processes it has to go before it is ready to be returned to Bessbrook.

When the linen comes from the loom it still retains the natural brown hue of the flax, and has to be changed to pure white. Before this can be effected many strange and wondrous processes have to be gone through, many battles with insidious chemicals have to be fought, and many startling miracles have to be performed by the assistance of ingenious mechanism. Nowhere are these various operations accomplished with greater success than at Glenmore, where the processes are carried on all the year round with undeviating activity. In the olden time bleaching operations were entirely suspended during the winter months, from the end of October to the middle of March, but as the demand for Irish linens increased, ways and means were soon found of making all seasons alike available for bleaching purposes

It was towards the end of the last century that the Glenmore firm (of which Mr. Jonathan Richardson was then the head, and three of whose great-grandchildren are directors of the present company, including Mr. Charles H. Richardson, one of the three managing directors) came to the determination to bring this change about. The firm had even at that early period a name and a reputation in the linen markets of the world, but when they made it known that they were going to make the attempt to bleach in the winter as well as in the summer, they brought upon themselves no small amount of ridicule. The trade laughed at the notion. The Richardsons, however, were not men to speak boastfully of their intentions, or to promise what they did not see their way to perform. Machinery was introduced in aid of nature, and before long the firm was able to execute bleaching orders at all periods of the year. It was their turn to laugh now, but they contented themselves with simply sticking to their business and extending its borders so as to cope with their ever-increasing orders. Improvement upon improvement was effected, and enlargement after enlargement, until to-day the firm stands pre-eminent amongst the bleachers and finishers of the province of Ulster.

The works at Glenmore are admirably situated. They stand in the midst of a wide expanse of fields and lawns perfectly adapted to the purposes of natural bleaching, and comprise in their substantially-built premises all the needful appliances and machinery for successfully carrying on the immense business of the firm. The river Lagan flows past the works, and forms the source of the water-supply for all the earlier processes, while the later operations, which necessitate the purest of water, are provided for by the storage of spring water in large reservoirs, one of which, about a mile distant from the works, covers an area of about sixteen acres. Motive power for the machinery is supplied by four large steam-engines, beam and horizontal, and one large turbine, and two ordinary water-wheels. These are capable of being worked separately, or in connection with each other, and provide ample power for all the requirements of the concern.

When the webs of woven linen, brown and raw in appearance, arrive at Glenmore, they are spirited away to a room reserved for their reception, where they have special marks of identification put upon them so that at any future stage they can be recognized. This having been done, they are forwarded to the boiling vessels, where a proper alkaline preparation is awaiting them, and into which they are ruthlessly plunged. When they have been well packed in, the covers are screwed down upon them, and steam is infused into their midst at high pressure. This process is continued for some hours—it may be only two, or it may be twelve, as the circumstances may demand. But, however long or however short the operation may be, no diminution of boiling power or chemical force is allowed to take place. A constant circulation of hot water, impregnated with the preparation, is kept up by means of an ingenious mechanical contrivance. When the boiling is completed to the satisfaction of the experts, the covers are unscrewed, and the linen is lifted out of its seething bath. The washing machines, which are automatically worked, next take the cloth in hand and thoroughly cleanse and purify it. Then the webs are taken on to the greens and lawns outside and lovingly spread out in all their snowy whiteness, where all the breezes of heaven are permitted to play upon them, their stay in the open air being timed in accordance with the atmospheric conditions. They are taken inside from time to time for further treatment, and again and again stretched out in all their length upon the grass.

The finishing processes are next brought into operation, in which many ingenious machines are employed, all working with precision and rapidity, taking the longest webs repeatedly through wet preparations, and then across drying cylinders, with the greatest ease. The machines used for the starching and blueing of pieces are particularly worthy of notice, dipping the cloth at one point into a mixture which seems to the uninitiated to have been specially contrived for giving back to the fabric all the impurities of which it has been previously cleansed, and the moment afterwards conveying it dexterously through a spray of pure water and over rollers, leaving it at the other end in a condition of immaculate whiteness. We now accompany the cloth to the beetling department, which is of great extent at Glenmore. The firm have two distinct systems of beetling machines in operation at these works, as well as at Millbrook, a mile or so further up the river, where auxiliary works are always kept in full swing. Amongst the beetling machines recently introduced at Glenmore is one of a new and much improved construction, and one of the largest to be found in the trade. Its operation differs considerably from that of the older class of machine; it attains a much higher speed and makes a greater number of strokes of the hammer, while it permits of several webs being beetled at the same time, some being put on while others are taken off. To admit of this triple arrangement, three rollers are conveniently placed, the whole being acted upon by suitable gearing. Upwards of a hundred beetling machines are used by the firm at Glenmore and Millbrook together. The calendering of the webs may be regarded as the final process of all, and this work is performed by machines of great size and power, having hot and cold rollers. Many kinds of goods, it ought to be mentioned, do not require to be submitted to these later operations, but are turned out with the pure and natural soft finish. Diapers and linens for nursery and domestic purposes supply instances of the class of goods referred to.

Not less than 300,000 pieces of linen cloth are bleached yearly at the works of Messrs. J. N. Richardson, Sons, and Owden, Limited, and their warehouse at Belfast, to which the goods are forwarded direct from the bleaching fields, is one of the sights of the town, being a large and handsome building in the Italian style. Here the linen pieces are subjected to a careful examination; after which they are folded and ornamented, and then dispatched to their various customers.

Returning again to Bessbrook we find that the cloth which has been received back from the bleachers has to go through the hands of the cloth-passers, who, with a rapidity that shows perfect knowledge, select the linens according to their qualities and set them apart for the various markets for which they are adapted. This inspection having been successfully undergone, the cloth has to be lapped, measured, folded, pressed, packed, labelled, and so forth, before being sent out to the markets. The show-rooms contain examples of every description of goods made from flax, from ordinary table linen to the richest damasks. One of the attractions on view is a damask table cloth in the form of a picture, a facsimile of one manufactured for the Philadelphia Exhibition, the design of which represents the signing of the famous treaty between William Penn and the Indians, "the only treaty never sworn on oath and never broken." The figures introduced into this woven piece of art are those of the Quaker founder of Philadelphia, his secretary, and two Indians, the grouping being effective and picturesque and the whole design one of great beauty.

A few more facts relating to Bessbrook ought to be mentioned before we take our leave of it. Being practically a teetotal colony it is natural that societies connected with the temperance cause should flourish there. There is a Band of Hope with nearly a thousand members, a temperance society, and an association of Good Templars. A brass band has also been established at Bessbrook whose musical exercises are of such an entertaining character that their services are often desired far beyond their own local borderland. Another valued institution in Bessbrook is its savings bank, for the encouragement of habits of thrift amongst the workers. The depositors are guaranteed five per cent. interest for their investments, and so largely is this privilege taken advantage of that it is no unusual thing to have a working man customer with his £300 or £400 safely earning its five per cent. at this institution Economy is a virtue that thrives in the Bessbrook atmosphere. You see evidences of it on all sides. Even the waste flax that the machines reject, and which in the form of fluff flies about in the air and settles on the floor, is utilized, realizing to the proprietors an income of from £1,000 to £2,000 a year.

Mr. John Grubb Richardson, whose name is a household word in Ulster in connection with the staple trade of the province, was born about the year 1800 in the town of Lisburn, where his grandfather, Jonathan Richardson, and afterwards his father, James Nicholson Richardson, were engaged in the linen trade. The ancestors of the family which is of English extraction, came over to Ireland about the time of Cromwell, and settled shortly afterwards in the village of Lisnagawey (now called Lisburn). At the time of the birth of John Grubb Richardson, the linen industry was in its infancy, bleaching operations being only carried on twice in the year, while the quantity of material which underwent the process was, as a matter of course, very limited. Along with the celebrated Dr. Handcock, Mr. Richardson's father was the first to introduce an improved method of bleaching linen, which enabled them to carry on the work all the year round.

After the death of Mr. J. G. Richardson's father, the partnership consisted of that gentleman, the late Jonathan Richardson, and Wm. Richardson, and they had works in Lisburn and Donegall Place, Belfast. Trade prospered in their hands, and owing to the great energy and ability of the partners, the business increased to an extraordinary degree, and in the year 1847 the then firm bought the Bessbrook estate. The Bessbrook works came under the immediate direction of Mr. John G. Richardson some years later.

During the time of the civil war in America the linen trade of the north of Ireland received a great impetus; indeed, the extraordinarily rapid growth of the town of Belfast, both in population and wealth, is chiefly attributable to this cause. During these prosperous times the Messrs. Richardson extended their operations to such a degree that their warehouse in Donegall Place, Belfast, became far too small for their business, and they erected their present magnificent premises in Donegall Square North, which are hardly equalled in the United Kingdom. About the year 1876, Mr. J. G .Richardson having through family relationship and other connection with the original firm of Messrs. J. N. Richardson, Sons, & Owden, again joined the latter concern, became chairman of both companies. With respect to the name of Owden, it need only be said that the member of the firm bearing this name, who was a brother of the late Alderman Owden, of London, entered the house in 1847 as an apprentice, and at the expiration of his term of service showed such an aptitude for the business that a partnership was offered to him, of which he availed himself, and he remained a useful member until the time of his death, about twenty-three years ago, when his place was taken by his son-in-law, Mr. Greer, late M.P. for Carrickfergus, who has since become deputy-chairman of the company.

Mr. Richardson, as a consistent member of the Society of Friends, has never taken any prominent part in politics, and has twice refused to be appointed to the commission of the peace. He has been married twice. His first wife was Helena, daughter of the late Richard Grubb, of Cahir Abbey, by whom he had one son, James Nicholson Richardson, late member of Parliament for county Armagh, and one daughter. By his second wife, Jane Marian, daughter of the late Thomas C. Wakefield, of Moryallen House, Gilford, county Down, he has had issue one son and seven daughters. Mr. Richardson has not taken any active part in business for many years now, but has entrusted his interests chiefly to Mr. J. F. Harris, the principal managing director.

The splendid warehouse of the company in Donegall Square North, Belfast, has always formed one of the chief objects of attraction for distinguished visitors to this part of Ireland. Since 1880 it has been visited once by Earl Cowper, when lord-lieutenant of Ireland, and twice by Lord Spencer while occupying the same exalted position. The last Viceroy of Ireland to honour the warehouse of Messrs. Richardson, Sons, & Owden by his presence was Lord Carnarvon, in September, 1885. But at no time has more interest been manifested in the work done by this firm than when the Prince and Princess of Wales visited the warehouse in April, 1885, and minutely inspected the goods produced by the firm, which were so arranged that their Royal Highnesses could see at a glance the extraordinary perfection to which the manufacture of linen goods had been brought. On the occasion of the last visit of the British Association to Belfast, this warehouse was selected as the one most suitable for showing the members the progress which had been made of late years in the national industry. Manufacturing operations are carried on by the company in many parts of Ulster in cottage hand loom weaving, with headquarters in Lurgan. Fine damask, linen, and handkerchiefs being chiefly produced. Adding these operations to those at Bessbrook we get at a total of about 7,000 persons receiving pay from the Bessbrook Company & Richardson, Sons, & Owden together. The Richardsons have, indeed, accomplished so much on behalf of the linen trade that their names will always stand prominently out in the long and honourable list of the builders up of Ireland's chief staple trade. It is on such lines that the future prosperity of the country has to be secured.

THE PLATTS OF OLDHAM.

THE PLATTS OF OLDHAM.

FROM a remote past there has descended to us a quaint ballad, the leading sentiment of which is expressed in the words,

> "Of o' sorts o' places,
> An' o' sorts o' faces,
> It's Owdham, brave Owdham, for me."

This love of place has always been a strong feature of Oldham life, and has had much to do with the building up of the town's prosperity. The people of Oldham are firmly convinced that no other spot in the wide world contains so many of the true elements of greatness as their own borough, and, within certain limits, it must be confessed, they are not without warrant for that opinion. Oldham has the largest number of limited liability companies of any manufacturing town in the Kingdom; Oldham possesses the wealthiest working-class population in the world; Oldham owns the most extensive machine works that have ever been established anywhere. These are facts which Oldham justly prides itself upon, and thus the refrain gets handed on, and "Owdham, brave Owdham, for me" continues to be said and sung from generation to generation, and, great as the town's past has been, it looks forward with eager confidence to a future that shall be still greater. In Oldham, more perhaps than in any other place, you see evidence of a reciprocal faith and trust: the immense army of workers which constitute its population believe in each other, help each other, co-operate with each other; the interests of employers and employed are acknowledged to be identical: thus, from year to year, the town goes on extending its industrial borders, increasing its material prosperity, and improving its intellectual life. True, it feels the ebbs and flows that mark the course of trade, in the textile branches, but, in spite of all fluctuations, its general record is one of steady success.

Oldham has been fortunate in having attracted to itself during the early years of the steam
achinery era several men of indomitable energy
oresight—men who were able to see the
rtunities for development which this new

power presented—men who, with strong inventive gifts of their own, could keep well abreast of the time in mechanical improvements, and who ultimately obtained for their efforts that full recognition of success which can only be bestowed when a very foremost position has been reached. Such efforts have been those which have resulted in placing the firm of Messrs. Platt Brothers & Co., Limited, of Oldham, as the first in the world in the magnitude of their operations in the production of machinery. This firm have set their mark upon Oldham in such strong lines that the stranger within its gates cannot fail to observe and be impressed by the fact. Above all the dinginess of the brick streets, the loftiness of the brick factories, the canopy of gloom created by the smoke, and the noise and bustle of the vehicular traffic, the evidences of the business activity of this firm are made manifest. On one side of the town they have an establishment at which 5,000 hands are employed; on the other they have a concern at which about 3,000 are engaged; the various works, exclusive of their collieries, covering an aggregate area of 55 acres, and the firm have possession of 26½ acres of land adjacent for further extensions, some of which are now in progress. In the comings and goings between these two gigantic industrial hives—in the daily sending forth of machinery from them to one part of the world and another—and in the clangour, and fire, and smoke which they give forth from morn to night—the testimony of their power is never absent.

It shall be our pleasing task to trace how this greatness had its origin; how, step by step, it grew to its present proportions; whose brains and hands have promoted its success; and what the picture is that it now unfolds upon the Oldham landscape.

The founder of the firm was Mr. Henry Platt, who prior to the year 1821 was a machine maker in a humble way of business at Saddleworth. Prompted by a desire to extend his field of operations, he, in 1821, removed to Oldham, and there began to make machinery for the cotton manufacture, the first order executed by him being the construction of a carding engine for Mr. Samuel Radcliffe, the originator of the firm of Messrs. Samuel Radcliffe & Sons. While at Saddleworth Mr. Platt had concerned himself only with the making of woollen machinery, but at Oldham he found himself in the very heart of the cotton manufacture, and, with hopes equal to his ambition, he determined to make the most of the advantages of his new position. After his first cotton carding engine had been completed, he took a small workshop at Ferney Bank, where he employed five or six men, and succeeded in establishing himself so well that he found it necessary to introduce further capital into the concern, and this he did, by entering into partnership with Mr. Elijah Hibbert, a prominent iron-founder in the town, and the firm then took the title of Messrs. Hibbert & Platt. Success attended their conjoint enterprise, and as their operations increased they moved to larger premises, settling down, after several such removals, in the Hartford Mill, the site of the present Old Works, which were afterwards built by them. From 1822 to 1837 the firm of Hibbert & Platt remained the same, but in the last-named year Mr. Platt's two sons, Joseph and John, were taken into partnership. The firm was now, "Hibbert, Platt, & Sons." So it continued until 1842, when the founder of the firm died, at the age of fifty, leaving his two sons, Joseph and John, and Mr. Hibbert to carry forward the good work which he had started. Mr. Joseph Platt fell into delicate health after his father's death, but lingered on until the 16th of March 1845, when he died of consumption at Ventnor, at the early age of thirty. Another of Mr. Henry Platt's sons, Mr. James Platt, attained his majority about this time, and became a partner, the firm being now composed of Mr. Hibbert, Mr. John Platt, and Mr. James Platt. On the 10th of March, 1846, Mr Hibbert died, and the surviving partners carried the business on with ever-increasing success under the old style of Messrs. Hibbert, Platt, & Sons. Mr. Hibbert's interest in the concern was committed to the charge of his executors until 1854, when, according to the terms of his will, his trustees disposed of his share to Messrs. John and James Platt. At this juncture it was considered expedient, in consequence of the great growth of the business, to enlarge the partnership, and with this view Mr. William Frederick Palmer, the head of the commercial and financial departments, and Messrs William Richardson and Mr. Edmund Hartley, the general managers of the works, were admitted as partners. The style of the firm was now altered to Platt Brothers & Co. Mr. James Platt took an active part in the management of the concern, and also devoted much time to public affairs. For several years he was a member of the Oldham Town Council, and was the originator and most active promoter of the scheme for the purchase by the Corporation of the property of the Oldham Gas and Waterworks Company, which was completed a few years before his death, and has been one of the main causes of the prosperity of the town and district. He was elected M.P. for Oldham along with the late Mr. J. M. Cobbett at the general election in 1857; but his promising career was unfortunately cut short on the 27th of August in the same year, when he was accidentally shot on the Saddleworth Moors while out shooting with a party of friends. In 1864 Mr. Eli Spencer, who had for some years occupied an important technical and commercial position in the business, was taken into the firm; and on the 1st January 1868 the proprietary was reconstituted as a limited liability company, in order to still further extend the partnership and add to the efficiency of the administration of this constantly increasing business, and to give a number of the heads of departments, as well as some of the principal agents of the firm at home and abroad, a direct interest in their extensive operations. From that time to the present the affairs of the company have been managed by a directorate, consisting of the former partners and two members of Mr. Platt's family and other gentlemen holding important positions and interests in the business. Thus the directorate is a thoroughly representative one, each director having had practical managerial experience of one or other of the departments into which this great concern is divided. Mr. John Platt was the chairman of the company, and retained in his own hands the principal portion of its interests, down to the time of his death in 1872, and when that widely-lamented event occurred, he was succeeded in the chairmanship by the gentleman who now holds that important position, Mr. S. R. Platt, his second son.

Having this briefly outlined the managerial history of this eminent firm, from its humble but hopeful beginning in 1821, down to the present date, embracing a period of sixty-four years of unexampled industrial activity—a period which has produced more inventions of machinery than all previous time—a period which has multiplied a hundredfold the productive power of England's looms and spindles—it will be an interesting task for us to speak more in detail of the life-work of the most prominent member of this famous firm, the late Mr. John Platt, M.P.

Mr. Platt, who for so long a term held the chief position in the firm of Platt Brothers & Co., was born on the 15th of September, 1817, being one of a family of nine children, four of whom were boys and five girls, John being the second son. John Platt was only four years of age when his father removed from Saddleworth to Oldham, and laid the foundations of the business which has since swelled to such enormous proportions. The demands of an ever growing business, as well as the want of adequate educational facilities, prevented Mr. John Platt from receiving that scholastic training for which his great natural abilities so admirably qualified him for taking advantage had there been the opportunity. The sound rudiments of an English education were, however, acquired by him in his boyhood at local schools, and he completed his school-life at an educational establishment at Dunham Massey. But, like all other men who have set their mark upon the world, education with him was a never-ending process, and he submitted himself to a self-culture far more important and effectual than any mere school training. His mind was early engrossed by those branches of mechanical and scientific knowledge which were necessary in the business he had to pursue, and in this direction his attainments were of a surpassing order—solid, sure and practical. He did not, however, confine his energies within the limits of business, but, apart from those technical and commercial matters which had the first claim upon him, his strong natural capacity, combined with rare courage and determination, caused him to explore for himself that wider field of human knowledge which was concerned with the manifold problems of existence, and social and political progress. He entered into political life almost before he had touched the period of manhood. He found himself in the midst of an agitation destined to work amazing changes and reforms in the condition of the people of England.

When Lancashire was called to do battle in opposition to the Corn Laws by Gibson, Cobden, Bright and Fox, Mr John Platt was not slow to respond, but joined their standard, and proved one of their most active lieutenants. Having once mastered the question, and thought it out for himself—having by reading and reflection brought his mind to their way of thinking—he threw himself into the struggle with all the ardour of his strong nature, and from that time to the day of his death, was to be found occupying a post of prominence in all our political and social struggles, his cause the cause of freedom and progress.

In those days, as in these, political strife was imported into social and religious questions, and matters of municipal government were made the special subject of fierce party contention. In 1847 an agitation was got up for the incorporation of Oldham, the Liberals, with whom was Mr. John Platt, ranging themselves on the side of those who desired the incorporation, and the opposite political party doing their utmost to hinder the charter from being granted. How persistently, and with what tact and ability, Mr. John Platt championed the cause of the "incorporators" is a matter of local history of which the people of Oldham are justly proud, for eventually, in 1849, the battle which had been so sturdily fought was won, and the charter of incorporation was granted. At the ensuing election of municipal representatives, every ward in the newly-made borough was contested, Mr. John Platt being one of the candidates for the St. James's Ward. He was returned at the head of the poll. At the November elections of the same year, his brother, Mr. James Platt, was returned for the Werneth Ward. How bitterly they fought their municipal battles in those days is shewn by the following little story:—The contest was so close in the Werneth Ward that one unfortunate burgess was seized by six men belonging to each side, and so pulled and knocked about in the struggle that his coat was literally torn from his back. When the bewildered elector entered the polling booth he declared he would only vote for that side which undertook to provide him with a new garment to replace the one destroyed. It is not recorded which side accepted the condition. All that is known is that he voted.

Mr. John Platt continued to fulfil his duties in the Oldham Town Council as the representative of the St. James's Ward down to the 9th of November, 1854, when he was elected Mayor. The gentleman who seconded his nomination on that occasion said that "from Mr. Platt's position in society, the large amount of property he possessed in the borough, the large number of hands he employed, and the persevering endeavours which he had made to elevate the town of Oldham, and improve the condition of the working-classes, he considered him well entitled to the highest honour that they could confer upon him." When Mr. Platt's term of office expired, in November, 1855, he was elected a second time, being the first Mayor of Oldham upon whom that mark of confidence had been bestowed. One of the leading events of his first year of office was the obtaining of parliamentary sanction to an important scheme for giving Oldham an adequate water supply. In his evidence, given before the committee of the House of Commons on that occasion, he stated that in 1837, when he first became a partner in the firm of Messrs. Hibbert, Platt & Sons, they had only 400 workmen, but at that time (1855) they had on an average 2,500 men employed. The scheme was sanctioned in its integrity. For a third time Mr. Platt was elected Mayor of Oldham in 1861, having been Mayor five years in all, three years in succession from 1854, and two years afterwards, 1861-2.

In other public work Mr. John Platt was no less zealous. He was constantly alive to the importance of railway accommodation for Oldham. The great district scheme which was devised in 1846 had his warmest support. The Act for it was obtained, but, from various causes, principally the want of funds, the lines were never commenced. The Greenfield branch was, however, forced on, Mr. Platt being one of the four gentlemen who compelled the London and North Western Railway Company to construct it in accordance with the terms of the Act previously obtained. Since then, the Oldham, Ashton and Guide Bridge Railway line, which again owes its existence to the energy, public spirit, and foresight of Mr. Platt, has been constructed, as well as the continuation of the Lancashire and Yorkshire line from Mumps to Rochdale and Royton. In all these plans for opening up Oldham to other parts of the world, Mr.

Platt ever took a leading part. He was also for many years a director of the London and North Western Railway Company.

The cause of education always found in Mr. John Platt a zealous and intelligent worker, and a most liberal benefactor. The Oldham Lyceum, which partakes of the character of a Mechanics' Institution, but is perhaps of more comprehensive scope, owes much of its prosperity to Mr. John Platt and his brother James. In 1847 Mr. John Platt was one of the vice-presidents of the Lyceum and took great interest in the scheme for obtaining a more commodious building in which to carry on the operations of the institution. The brothers subscribed handsomely to the building fund, and the new Lyceum was opened on the 25th September, 1856. In 1859 he gave £500 towards clearing off the debt from the institution, and offered annual sums as prizes to be competed for by students. In 1863 he proposed to the directors of the Lyceum that if they would provide a suitable building for the purpose of a School of Art, he would pay any cost in excess of receipts for carrying on such a school, and in 1864 he presented the Lyceum with the noble School of Science and

Art buildings which adjoin the original structure in Union Street, the cost which was upwards of £2,000. The firm of Platt Brothers & Co. also presented all the models and casts for the use of students of that institution. In 1865 Mr. John Platt was elected president of the Lyceum, and in 1867 he presented to its library a number of valuable scientific works, intended for reference. Mr. Platt took a deep interest in the scheme for extending Owen's College, Manchester, the firm contributing £500 to the extension, as well as £500 towards the founding of a professional chair of engineering there. In the establishment of news and reading rooms in connection with the works; in promoting the Werneth Mechanics' Institution, towards which he contributed £500, and in a hundred other ways, Mr. Platt shewed how much he had at heart the education of the people. Mr. Gladstone inaugurated the new Werneth Mechanics' Institution building in 1867. Since then the firm have benefited the undertaking in various ways. They have given an annual donation of £100, besides paying the fees of all the half-time scholars from the works. They likewise pay the fees for all their scholars attending the Roman Catholic schools of St. Marie and St. Patrick, Oldham. It should be mentioned also that Messrs. John and James Platt gave the land for the site of St. Thomas's Church, Werneth, and when the building was completed in 1856, and it was found that the donations fell short by £1,900 of the cost of the erection, they generously made up the deficiency. Mr. John Platt afterwards kept the edifice in repair, and expended more than £1,000 additional in altering and improving the church. In all the charitable institutions in the town he evinced the most lively interest, and constantly assisted them by his benefactions, a gift of £500 to the Oldham Infirmary being one of the latest of his public donations prior to his death.

As has already been mentioned, Mr. John Platt was from early manhood an earnest politician, his sympathies being always with the more advanced section of the Liberal party. For upwards of a quarter of a century he was before the public as a politician, first coming into prominence at the time of the Oldham election of 1847, when there was a severe contest in the borough. Mr. John Fielden, of Todmorden, who had up to that time commanded the support of the Oldham Radicals, had determined to force Mr. J. M. Cobbett into the position of his colleague, and, as the latter was held to be unsound on many points, the Liberal party declined to accept Mr. Fielden's dictation in the matter and brought out Mr. Fox, and the Tories brought out Mr. Duncuft. The struggle was a fierce one, and excited the strongest party feeling. Mr. John Platt acted as chairman of the Radical Committee, and there is no doubt his intelligent advocacy and admirable tact contributed in a large degree to the success which his party achieved on that occasion. When the numbers were declared at the close of the poll the votes recorded were—for Fox 725, Duncuft 694, Cobbett 624, and Fielden 612. From that time down to the year 1857 Mr. John Platt retained the position of chairman of the Oldham Liberals, and did much useful political work while acting in that capacity. He was often solicited to allow himself to be nominated a candidate for parliamentary honours, but until 1865 he declined to come forward. In that year, however, the pressure that was brought to bear upon him was too strong for him to resist, so he came out along with Mr.

Hibbert, and was returned with that gentleman, the numbers being—Hibbert 1,105, Platt, 1,076, Cobbett 898, Spinks 846. At the general election of 1868 the same four candidates stood a contest, with the result that Mr. Hibbert and Mr. Platt were again returned. Mr. Platt continued to represent Oldham in Parliament down to the time of his death, and always commanded the confidence and respect of his constituents; even those who were opposed to him in political thought could not but allow that in all public matters he brought to bear an enlightened perception and a strong sense of justice and right. No one had a word to say in disparagement of him, for he was so honest and sincere in his political action, and so firm and unflinching in his convictions, that his opponents could not withhold their admiration of his straightforwardness. He did not claim to be an orator; indeed, he did not do his natural power of speech justice, being at all times reluctant to address an audience; but on the few occasions when he was prompted to throw off his reserve and was prevailed upon to express himself upon questions which were agitating the public mind, he spoke with an ability and an earnestness which secured him respectful attention. In the House of Commons he seldom made any lengthy speech, but in committee work his extensive knowledge of industrial matters was of great service. When at home in Oldham, amongst his own townsmen, feeling the encouraging influence of their genial approbation, he frequently grew eloquent while on the platform, and expressed his views and opinions with a facility which elicited general admiration. The last speech delivered by Mr. Platt to his constituents was on the 31st of January, 1872, when he spoke upon the labour question at some length, his address showing a complete mastery of the subject and a deep desire to look from the workers' standpoint as well as from that of the capitalist. He urged his hearers never to forget, above all, that England had a magnificent industry to uphold, and that it was our first duty to see that that did not suffer. The nine hours movement had then, as far as regarded engineers and machinists, become an accomplished fact. It had begun in a very small way at Newcastle, and from there had rapidly extended all over the country The rapidity with which the movement had spread showed to him that there was a feeling in the minds of the people that the time had come when the nine hours limit could be safely conceded. Such questions must always be settled to a great extent by mutual agreement. It was neither good for the operative nor good for the employer that when a demand was made it should be immediately accepted or rejected. It wanted to be looked at all round, for it was quite possible that in acceding to the demands the industry we had worked so hard to get might be imperilled, while, on the other hand, it was not advisable for the masters to completely and at once resist any demand that might be pressed upon them; it was due to the employed that the question should be fully and carefully examined, and if the masters should be of opinion that they were being asked to do something unreasonable, then both sides ought to meet together and settle the matter by fair argument. He recognised the strength and importance of trades unions, and felt that when once a workman had joined one of these associations he could not afterwards act individually. It was no matter how well a person might be treated by any master or employer, or however good the system might be in his workshop, if an order went forth from the trades union he was bound to obey, and for obeying the orders of his society he received, as a matter of right, the whole protection of his fellow members. It was almost impossible for any single employer of labour to resist a combination existing amongst his workmen, and he did not see any objection nor had he ever seen any objection to a body of employers meeting a body of the representatives of working men, and when any demand was made, either on one side or the other, that it should be fairly discussed across the table, and the arguments on both sides listened to. Then, if the masters were able to prove that to grant the demand of their workpeople would be to jeopardise our commercial supremacy, he was quite sure the reasonableness of the employed would at once cause them to give way. He thought that employers and employed should never be placed in antagonism to each other. They were both anxious to preserve the industry of the country, and he was quite willing, for his part, that the workmen should have their fair share of the profits of that industry. He thought, too, that there was a means other than that of trades unionism by which that might be brought about. They had a system in existence in that town, he reminded them, which was spreading rapidly throughout England, and that was the system of co-operation. He had always been one of the strongest advocates of that system, and he could not lose sight of the fact that there was a certain amount of antagonism between trades unionism and co-operation. Still, there were lessons to be gathered from each, and it was for them to put into practical application the highest principles of right and justice to secure to themselves the greatest possible amount of prosperity. He advised both masters and men to do all they could, consistently with what was due to each other, to uphold the trade of that district, because by that alone did their prosperity exist, and by that alone could they continue to be a great and flourishing community.

It was in such speeches as these, in which his strong love of right was made so manifest, that Mr. John Platt gained so powerful a hold upon the affections of the people. Only the year previous to his death (1871) an address was presented to him by the working classes of Oldham, the occasion being celebrated by a popular demonstration in which the greatest enthusiasm was displayed. The address contained over 8,000 signatures, and the presentation was made in the Oldham Co-operative Hall. The following extract from the address may be regarded as succinctly expressing the claims of Mr. Platt to some signal recognition at the hands of the people of Oldham: "We cannot look upon the noble institutions in this town which you have either been the means of establishing, or to whose development and completion you have largely contributed, without feeling how much the earnest friends of popular education have to thank you for your generous and sympathetic responses to all applications for aid to educational schemes, no matter by whom initated and irrespective of either sect or party; by these things you have shown to us the true catholicity of your mind, and the universal charity of your heart. * * * We attach no little importance to the many material advantages which the people of Oldham and its neighbourhood of all ranks and conditions have derived from your great commercial enterprise and your business capacity. They have provided employment and wages for thousands of our industrious people; they have created business for our tradesmen; they have enhanced the value of the lands and other properties of our richer neighbours, and have been the means of bringing and diffusing amongst us a stream of wealth which under other circumstances would, if circulated at all, have been so in other towns, and a great deal of it, no doubt, in other countries. We are aware of the great self-sacrifice involved when a man in such a position as yours, with so many cares and heavy responsibilities, abstracts from his own affairs the time and thought which a useful public career demands."

On the 29th of February, 1872, Mr. John Platt, accompanied by his wife, a daughter, and a niece, left England for the Continent, with the intention of enjoying a brief sojourn in Italy, his health having been for some time previous in an unsatisfactory condition. While at Florence Mr. Platt was taken worse, and on proceeding further south, to Naples, alarming symptoms set in, and it was considered advisable that he should return home with all possible speed. He reached Paris on the 12th of May, 1872, and could get no further, but was there placed under the medical care of two eminent physicians. Their skill could afford no relief, and a few days later he died at the Hotel Maurice. His remains were conveyed to England, and he was buried at Oldham amidst the sorrowing regrets of the whole population.

A local paper of that period—the *Oldham Chronicle*, to which we are indebted for some of the foregoing particulars—says: "Amongst the many public measures which Mr. Platt helped forward, his assistance to Mr. Cobden when engaged in negotiating the French Treaty may be referred to. There can be no doubt that his vast commercial knowledge, and his position at the head of the largest machine-making firm in the world, were of very great service in arranging the details of the Treaty, and Mr. Platt was fully justified in looking back upon that portion of his public service with considerable pride and satisfaction. While occupying the position of parliamentary representative for Oldham, he consistently spoke and voted in favour of every great Liberal measure having for its object the welfare of the country at large. Locally, in addition to the honours conferred upon him as chief magistrate for five years, he was in the commission of the peace for the counties of Lancashire and Carnarvon, and in 1866 was appointed deputy-lieutenant for Lancashire. He was also deputy lieutenant for Carnarvon, and some years ago held the office of high sheriff for that county. He was a member of the Oldham borough bench from its formation, and for a considerable time the chairman of the Oldham, Ashton and Guide Bridge Railway Company. In every capacity and sphere he did his duty manfully and nobly, and we may well say, with the assent of the entire community of Oldham, 'We ne'er shall look upon his like again.'"

A few years later, in 1878, a statue was erected in Oldham to the memory of Mr. John Platt, and stands there to-day, one of the most treasured objects in the town. It was erected by public subscription at a cost of between £3,000 and £4,000, the statue being designed by Mr. T. W. Stevenson, of Edinburgh. The inscription on the pedestal bears but a few simple words of record. The statue was unveiled in September, 1878, in the presence of 50,000 people, who gathered there to do honour to the memory of one who had well deserved the recognition.

As an instance of the commercial sagacity which has all along attended the management of the great industrial enterprise over whose fortunes Mr. John Platt so long and so ably presided, it is only necessary to refer to what the firm did during the time of the Cotton Famine, when Lancashire generally was rendered helpless and wretched. At that time the attention of the firm was directed more especially to the adaptation of the machinery then in operation to the working of East Indian and other short-stapled cotton, which had previously been used only to a limited extent, and for what are known as "low numbers" of yarn. Success attended their efforts in this direction, and the advantage to Oldham and the surrounding district was so great and so immediate that there was an increase of spindles of about 500,000 there during the time when other towns were plunged into the very depths of distress. In fact, the presence of difficulties spurred Messrs. Platt to greater exertions, and finding that the ordinary cotton trade, on which they had hitherto chiefly relied for their orders, was failing them, they set themselves to make up for the deficiency in other quarters. Thus it was that they came to extend their production of machinery for the woollen and worsted industries, the latter being a "new line" altogether for them. How well they succeeded is evidenced by the fact that to-day not only do they stand pre-eminent as makers of cotton machinery, the trade in which returned to them with two-fold vigour when the Cotton Famine came to an end, but they stand almost in the same position in regard to the construction of woollen and worsted machinery. Thus, they take in almost the entire field of textile work in this country, while on the Continent of Europe, in North and South America, Mexico, Egypt and the Levant, in India, China and Japan —wherever, in fact, machinery for combing, spinning, or weaving is required—their machines are in active working.

The firm has always been progressive. Each year sees its operations extended. The old spirit still survives, although the reins of management are distributed amongst a greater number of persons than was the case during the ante-company period. Fortunately, the directors are all gentlemen who have grown into their positions, as it were, and who devote themselves entirely to the business. One department dovetails perfectly with another, and the great work of machinery making proceeds in an even, uninterrupted course, from year end to year end, while all the time the outlook over the whole extent of the world of machinery is carefully scanned, no opportunity being lost of keeping Messrs. Platt Brothers & Co. in direct communication with every market. At one time it was hinted to Mr. John Platt that the concern of which he was the head had touched the summit of success, and that it was not desirable, even if possible, to extend their operations any further. Mr. Platt replied with characteristic calmness: "No doubt the undertaking is gigantic, and the number of people dependent, more or less, on one establishment, is immense. But I can say this, that so long as I am supported by my present partners with the ability they display and have displayed in the manufacturing of machines, and also by the workmen with whom I am surrounded, I feel no hesitation whatever in hoisting the banner of progress; and I am quite certain that, with the talent and ability I have around me, we shall overcome every obstacle." It is well known that this anticipation has been fully realised.

Mr. Samuel Radcliffe Platt, the present chairman of the company, is the second son of the late Mr.

John Platt, M.P., who left thirteen children, seven sons and six daughters. Born and nurtured in Oldham, introduced to the Hartford Works in early manhood, and having by practical experience as well as inheritance made good his claim to the honourable position he now holds, Mr. S. R. Platt may be considered to stand very much in the same position as that occupied by his late father. First and foremost, he is a man of business; after that he is, in an unambitious sort of way, a public man; and then, he is a man who attends to the enjoyments of himself and his family circle in a manner that is at once rational, refined, and artistic. His business instincts are solid and worthy of the name he bears, and his tastes, apart from business, are those of a large-hearted, healthy-minded English gentleman. He is on the commission of the peace, and has done good work as a member of the Oldham Town Council, but beyond that point he has not hitherto allowed his ambition to carry him. The pleasure that gives him the most delight, and is most in harmony with his nature, is that of yachting. His yacht, the *Norseman*, has conveyed him over many seas, and taken him within sight of many impressive scenes. On board the *Norseman* he has contemplated the midnight sun, and made himself familiar with the glorious ffjords of Norway; on board the *Norseman* he has sailed into tropical regions, where, amidst burning heat and dazzling sunlight, he has seemed to touch the shores of fairyland; but, wherever he has been, however distant from his native land, he has never forgotten the busy hive of industry which he has left behind him at Oldham. Mr. S. R. Platt is a keen lover of music, and does much for the promotion of that art. He has a private band of some fifty performers, selected from our leading orchestras, to play for him and his guests once a week during the winter at his mansion in Werneth Park, and to all musical movements in Oldham or Manchester he lends a generous support. On the occasion of his marriage, in May, 1884, Oldham was very demonstrative in its desire to do him honour; addresses were presented to him; banquets were given; and, one way and another, the town got through an amount of rejoicing that constituted a very high compliment to the bridegroom. Amongst the many expressions of admiration and good feeling which this event called forth, it was stated that "no man could with adequacy of enjoyment to himself devote himself entirely to material conquests, least of all has Mr. Platt. With much of the care and responsibility of a gigantic industrial establishment on his mind he has yet found leisure to promote the musical cultivation of himself and of his neighbours. His wealth and social position could easily have made him forgetful of these things; but, like a true citizen, and ever keeping before him the fact that *noblesse oblige* holds good in every rank in life, he has acted the better part, and, shunning those pleasures which almost unbounded affluence could give, he has cast his lot with the people. Mr. Platt is a man of the people. He is of true English grit—one of those components that are the backbone of English nationality. He may not lay claim to great and striking gifts, but he possesses that which is a surer balance through life—sound common sense, a capacity to understand popular needs, and an aptitude for seeing the practical and useful, and making it subservient to some good purpose. But it is not alone as a man of business that Mr. Platt seeks to take his stand and be judged by his fellows. He is a patron of the arts, and his choir is a living instance of what may be done by a gentleman of ample means in guiding and stimulating the more elevated tastes of the people." To have deserved such warm eulogies as were passed on Mr. S. R. Platt at the time to which we refer is a great deal, but to have obtained them is still more. One of the workmen, Mr. Joseph Palmer, observed at a public presentation to Mr. and Mrs. S. R. Platt, "that Mr. Platt, when a young man, was never ashamed or afraid to soil his hands or to work in the Works, so that he was getting practical knowledge, which has served to fit him for the position he now occupies. He has gone through all the branches of skilled labour, from the wood patterns to the finished article. He has worked at the bench as a joiner, in the sand as a moulder, at the anvil as a smith, at the vice as a fitter, and in the mill to erect and set to work the different machines when completed. I do not think he has forgotten any of the old faces, with whom he worked when young, and that he was then, and still is, grateful for the many practical lessons he received from them when studying for a mechanical engineer." Mr. Platt, in acknowledging this reference to his days in the workshop, said:—"I have been for twelve years chairman of the board of directors, since the lamented death of my father, Mr. John Platt, and I may say that nothing has ever given me greater pleasure than the passing of the few years of my life at work amongst you—labouring at the same daily toil with you yourselves, and fulfilling the same duties. In that work I gained an insight into your characters, and into the character of the work. This has been the best means of my education, and of my achieving whatever success I have gained since then. It has been a labour of love with me, and the best days I have spent have been in the workshop." These words are sufficient in themselves to show the force of character possessed by the gentleman now at the head of this celebrated firm. The same spirit prevails in the management all through. The directors are gentlemen who have distinguished themselves in this business by their technical or commercial abilities, and all have obtained their experience in connection with this firm, each being as well acquainted with the practice as with the theory of their business. In 1875 the Oldham Science and

Art School became too small to accommodate the number of students attending the classes; Mr. Henry Platt, Mr. S. R. Platt, Mr. Frederick Platt, Mr. Joseph A. Platt, Mr. John H. Platt, Mr. James E. Platt, and Mr. Sydney Platt, sons of the late Mr. Platt, decided to pull down the building and rebuild it on a scale of sufficient magnitude to meet the requirements of the town for many years to come, as a tribute to his memory, and so as to make the school what Mr. Platt intended it to be. The present handsome building shews how well that intention has been carried out.

We will now attempt to give a brief description of the immense machine works conducted by this firm. As we have said before, the works are 55 acres in extent, exclusive of the collieries, and the firm employ between 7,000 and 8,000 hands.

The new Hartford Works at Werneth are the largest in extent. At these works 5,000 people are employed, and it is one of the sights of the town to see this immense body of toilers at noontime or night, pouring out in so many living streams from all the avenues of egress the place contains. It is a sight never to be forgotten. The evidence of their employment is upon them, for contact with iron is not exactly conducive to cleanliness of appearance; but they are a hardy, stalwart, healthy race for the most part, not by any means bent and haggard with toil, but representatives in the best sense of that dignity of labour which the results of modern enterprise have taught us to respect and admire. As we watch the thousands of workers emerging from the works at all points, we get an idea of the vast extent of the establishment. The main building is of brick, and merely to travel round its external boundaries is a task of no little difficulty, never to name the amount of walking that you must do if you explore the mysteries of the interior, with its wondrous succession of foundries, machine-rooms and workshops. This gigantic machinery farm of innumerable acres, revealing miles of flooring, thousands of machines in all stages of construction, and an army of machinists such as no other machinery concern in the world can shew, is calculated to inspire one with astonishment and almost awe, and to attempt to give a detailed description of the place would be to enter upon a labour that would require months of application and could only be adequately performed by producing a voluminous work. Then, away from the machinery works proper, there are numerous supplementary establishments—timber yards, saw mills, forges, brick yards, and what not—constituting altogether an industrial colony of great magnitude.

We will, to begin with, take a brief glance at these "outside" places. The brick works are in active operation. On land purchased by the firm many years ago a valuable seam of clay was found, and, ever ready to turn to advantage any fresh opportunity that might arise, they at once entered upon the manufacture of bricks from this clay by steam power, and have from that time to this continued to make these articles, adding improvements from year to year, until now they have one of the most perfect establishments of the kind in existence, and supply bricks to the building trade in all parts of the northern counties. The collieries owned by the firm are too far away to be within easy visiting distance, so we content ourselves with such particulars as we are able to glean concerning them. They are situated at Moston, near Manchester, and at Milnrow, near Rochdale, and when in full operation yielded for the Hartford Works alone 36,000 tons of coal per annum, while a large quantity was allowed to go to other consumers, the mineral being of such excellent quality as to cause it to be in considerable demand. At Moston the company worked three seams of coal of various qualities, the recent output being 2,000 tons per week. Arrangements are in progress for considerably increasing this output. The Moston coal takes a good position in the market as a house coal, both best and seconds, while for furnace purposes and brick-burning it is all that can be desired. The fine slack which is left after screening " nuts " is washed by means of an effective apparatus, and is much sought after. The Moston coal-field is heavily watered ; indeed, at the present time (1886) the firm's collieries there have been drowned out and temporarily abandoned, but new pits are being sunk to recover the same coal in another part of the field. The shale is made into bricks, and both at Moston and at Oldham, they make about a quarter of a million bricks per week, including the close-fire, open-fire, machine-pressed qualities, and the ordinary fire bricks and blocks. The other collieries, the Brushes Clough, Butterworth Hall, and Jubilee Collieries, are the coking seams known as the Mountain Mine or three-quarter mine, one coal averaging a little over 18 inches in thickness, and being of excellent quality for either domestic or coking purposes. The company have three winding shafts at Tunshill, Butterworth Hall, and Jubilee respectively, and they get about 20 statute acres of coal per year in this district. This field, like that at Moston, is heavily watered, and the pumping plant at four stations is of an interesting character. The firm have ninety ovens for making furnace coke, which is considered equal to Durham quality, and also coke setts for burning soft coke for smithy use. At the Brushes Clough Colliery a very powerful apparatus for washing slack for coking is in operation, taking out all the shale and dust from the small coal. At this place they also get fire-clay for making fire-bricks, &c., which stand an enormous heat. They have also a sand-grinding mill, where they provide the sand required for their foundries. The Ganister sand is the most important, being ground from a white rock containing a large quantity of silica, which is chiefly used for the lining of cupolas. Lines of rails extend from the several collieries to the

Hartford Works, and trains of coal waggons, drawn by locomotives, are constantly to be seen passing to and fro. It ought to be mentioned also that the Lancashire and Yorkshire Railway line runs direct into the works, and connects the new establishment with the old one, the distance between them being nearly two miles. The firm, by a special arrangement with the Railway Company, were granted the privilege of despatching two trains a day each way, between the two works, but this has been found insufficient, and frequently a third train has to be added. About sixty railway waggons are engaged in this traffic alone, besides the necessary engines. The railway facilities enjoyed by Messrs. Platt Brothers & Co. are now all that could be desired; they are in direct connection with the entire railway system of the country, and are able to despatch their machines to any point with the utmost rapidity. It is interesting to watch the loading and unloading that is for ever going on, and to observe how differently the machinery is packed for different countries.

The timber-yard is of great extent, and contains huge piles of wood and solid blocks of timber from far-off countries, stored up for future use, and undergoing that necessary process of seasoning by wind and weather, without which it would be impossible to provide wood of sufficient reliability and strength. The Waney pine timber is principally grown in the State of Michigan, and is shipped from Quebec. About 300,000 cubic feet per annum of this timber is cut up by the company for their own requirements in machine making, together with 20,000 feet of Honduras mahogany and cedar wood. The origin and age of each block of timber is duly recorded, so that there is no danger of any wood being used which time and weather has not set the seal of efficiency upon. Large steam travelling cranes are to be seen in various parts of the yard, and in the lifting and conveying of timber blocks to the saws or elsewhere they are of incalculable service. The saw-mills cover eight acres, and scores of steam-saws are there to be seen daily at work reducing the immense logs of cedar and oak to proper proportions, the noise that they make being perfectly deafening. The sawing machinery, which is nearly all of the firm's own make, is driven by a compound horizontal steam-engine of 400 horse-power, which is worked in a handsome building adjoining. The steam is supplied by a stack of three boilers. In connection with the saw-mills there are rooms in which all the operations of wood turning and joinering are carried on by the aid of the most improved appliances. Then there are drying-rooms, fitted up with stoves, heated by steam, the building being constructed on fire-proof principles. The firm keep on an average not less than 400,000 cubic feet of timber "steered" in the yard, besides an immense quantity of wood in logs The saw-mills and timber-yard are lighted by electricity, by means of sixteen 2,000 candle Brush electric lamps, the dynamo in connection with the apparatus being kept in the engine-house. As much as 350,000 cubic feet of timber can be turned out of these saw-mills in the course of a twelvemonth.

Some distance from the saw-mills we come to the Forge, where all the wrought-iron used by the firm is produced. The surrounding ground is occupied with piles of pig-iron ready to be carried forward to the furnaces. Entering the Forge we find a number of furnaces in full blaze, and see men at work manipulating the molten metal, forming it into unshapely balls, and afterwards, by the aid of the steam-hammer, reducing it to shape and consistency. The iron comes to Messrs. Platt Brothers & Co. in its original "pig" form, fresh from the smelters, and such portions as are required for the framework and gearing of the machines is transferred direct to the cupolas connected with the foundries, but the remainder, which is used for constructing the tougher and more elastic pieces of machinery is brought to the forge and there undergoes the various processes of refining and hardening. To free the metal from the excess of carbon which it contains when it comes from the blast furnace it is "puddled": that is, a mass of metal is exposed to intense heat in the furnace, and while in a state of fusion the "puddler" manipulates it with a long rake, submitting it to the action of the oxygen which passes over it from the fire. As this process approaches completion, the "puddler" collects the white-hot metal into balls of twelve or fifteen inches in diameter; these are removed from the furnace and placed beneath a powerful steam hammer, the successive blows from which knit it together and impart to it the necessary elasticity. When the ball of semi-boiling matter has been hammered into an oblong block, it is then passed between a succession of iron rollers and elongated into what are termed "puddle-bars." These bars are again cut up into short lengths, piled together, and mixed with scraps of old malleable iron ; it is then once more heated in the furnace and submitted a second time to the hammering process. When it leaves the steam-hammer at this stage, it is re-heated and put through another series of rollers, until finally the bar is reduced to the shape or size required, or it may, if necessary, be reduced by a similar procees to sheets or plates. There are many furnaces, many steam-hammers, and many sets of rollers constantly engaged in these operations, and all the place seems alive with fire and flame, the red-hot splinters flying hither and thither under each blow of the steam-hammer, rendering it necessary for the men to guard their faces by means of iron masks. When cool, the malleable iron is placed on the railway waggons and taken, by the assistance of a locomotive, into the smiths', turning, and fitting shops.

Proceeding now to the Hartford New Works, we are first introduced to the pattern room, where men are busily engaged in making the various patterns used in the formation of moulds for castings; and following these to the places where they are being brought into use, we find ourselves in the midst of a scene of dust, heat, and din that could hardly be paralleled. There are no fewer than five large foundries, each devoted to its own particular work, and all as busy as they can be. Men are to be seen walking about with vessels of boiling metal, suspended between a couple of long poles; they stop here and there to pour their molten burden into such moulds as have been made ready for the casting process, and the bubbling metal spreads itself amongst the lead-coloured earth like burning water, until all the interstices are filled, and nothing remains to be done but to wait for it to cool into the shape and consistency required. In this department, the men seem to be almost of the colour of the moulds in which they work, and it is only when the light flashes here and there, that their faces can be clearly discerned. These foundries contain a number of cupolas, and produce on an average

460 tons of castings a week, the larger proportion of them being very small. Many moulding machines are used, and these can be managed by boys, thus securing not only a saving of labour cost, but a greater perfection of casting than could be obtained by hand-work. Wheels and pulleys are moulded in hundreds every day. The cast-iron boxes and covers for the moulds for the heavier castings are all lifted and carried from one part of the moulding shop to another by means of powerful hydraulic cranes, each of which is managed by a boy, who, by the aid of a lever, controls the motions of the lift. But all this portion of the Hartford New Works seems enveloped in a grey mist, and has a weird appearance altogether, suggesting a modified Inferno.

Moving forward a stage, we reach the core drying stoves; then we go on to the casting dressing shops, which are also of great extent. Many of the smaller castings are dressed by machinery; indeed, it may be taken for granted that in all cases where a machine can improve upon hand labour, Messrs. Platt Brothers & Co. will have such a machine in operation. We are next introduced to what are called the Roller Turning Departments. There is a top-roller and there is a bottom-roller department. Top rollers are made of cast metal, while bottom-rollers are of wrought iron and steel. This department is one of great extent. While wandering through its many rooms, we see hundreds of lathes and other machine tools at work, with as many workmen as there are machines, or more; and such a whirring, buzzing noise assails our ears as almost deprives us of the power of speech. Overhead there is a complete forest of belting, whirling round at a speed that takes one's breath away. The boring machines are to be observed running their drills through the centre of the rollers with unceasing regularity and precision, never deviating a hair's breadth from the lines set down for them to travel. Then in connection with the bottom-rollers, there are the fluting machines which are, perhaps, still more wonderful in their mechanical power. A large proportion of these rollers are subsequently case-hardened, and this represents a conparatively recent improvement introduced by Messrs. Platt Brothers & Co., and one that the spinning trade is likely to appreciate and benefit by. There is no waste space in all these rooms, the lathes and benches are placed as near each other as comfort and convenience will admit of, and in the division of labour the highest possible economy is exercised. Some men have been for the best part of their lives engaged on just one little branch of work—it may be turning a screw, fixing a bolt, boring a centre, or filing a wheel—and from the 1st of January to the 31st of December, year after year, he will go on repeating that one small operation, until he gets to do it almost mechanically. There can be no doubt as to the monotony of this kind of service; nor can there be any doubt as to the general economy of the system, for the man who has only one thing to do, will, in the nature of things, do it much more rapidly and correctly than the one who merely tries the work now and again. It is said that Messrs. Platt Brothers & Co. have men in their employment who have never deviated from one particular little bit of service for forty years; still they are not unhappy, for the work is easy, and the remuneration good, and as a rule, the ordinary British workman is well satisfied with such a condition of things. Referring once more to the roller making, however, it is stated that the firm produce as many as 10,000 lengths of fluted rollers per week.

The grinding shops next command attention. Here we see long rows of grindstones revolving with lightning rapidity, the grinders or glaziers sitting on swing seats, pressing portions of machinery upon the stones, from which streams of red and blue flame are wildly rushing. The men appear to be riding furiously into space on imaginary steeds, only they never get any further, for the wheels go on whizzing, and the fire goes on flying, and they remain just where they were. This work not only seems hard but dangerous, for the castings break sometimes, and now and then a stone becomes worn until it is liable to throw up obstructions that may have the effect of removing the rider from his seat.

It is something of a relief to escape from this room to the smith's forge, where the glow of the fires, and the clang of the hammers on the anvil greet you. It would seem that, with all our acknowledged improvements, in the manipulation of iron, there are still some special things that remain to be done by the hand of the smith as in the days of old. Still, we find that Messrs. Platt Brothers & Co. employ a large variety of stamping and forging machinery, giving mechanical aid wherever it is possible. All the bar and other malleable iron used here is the product of the Hartford Forge.

From this point we proceed to a large room containing nearly 400 lathes and boring machines, mostly self acting. The room is 220 feet long, and 70 feet wide, and is devoted entirely to the treatment of cast-iron portions of machinery. Other rooms of equal dimensions are given up to the turning and finishing of wrought-iron pieces, such as shafting, studs, screws, and the like. Then there are rooms for other distinctive work, making altogether at this point a ground of labour concentration marvellous to look upon. From thirty to forty tons of finished shafting are turned out every week. One variety of shafting produced is dealt with by a series of ingeniously contrived machines, from which it emerges, without being turned, in a perfectly "true" condition, and with a fine smooth surface which admirably adapts it for the special purposes for which it is designed. It may be mentioned that the firm employ altogether 2,200 lathes, together with a proportionate number of planing-machines, slotting and drilling machines, grinding and glazing tools, file-cutting machines, &c.

The millwright's shop and its immediate surroundings have thus been described by a machinery trade journal : The millwrights' shop is well supplied with planing and other machine tools, and there the millwright work is accomplished, and in the repairing shops, &c., where they have an efficient staff of mechanics, the firm do all their own repairing. Then there are the loom-shops. Here the loom-frames from the foundry are planed, drilled, and otherwise manipulated, prior to being fitted together, which is also done in this shop. All the joints of the looms are planed, and when fitted can hardly be distinguished. When fitted complete, the looms are painted, and then taken to pieces, tallowed, and packed for despatch, the trucks to receive them coming alongside. Incidentally, we may here remark, that the packing-case shops constitute by themselves a large concern. They are fitted with a full complement of wood-working machinery, and an enormous quantity of deals are cut up, and metamorphosed into packing-cases in this department in the course of a year. The carriage department, where the carriages for the "mules" and twiners are produced, comprise a number of long and spacious workshops, fitted with, for the most part, special sawing, boring, tenoning, jointing, and other automatic wood-working machinery, including some of the most cleverly contrived labour-saving appliances ever seen applied to the manipulation of wood. The various processes are accomplished with extraordinary rapidity. Elsewhere, the iron, brass, and other carriage mountings, are prepared and fitted to the carriages, which in another shop are finished, painted, packed, and lowered through hatchways on to trucks below ready to receive them. Looking in at another department, we find the wooden lathes for looms being finished ready for fitting to the looms, and next we are shown over the "mule" shops. Here the self-acting "mules" are produced, the frame-work and other castings from the foundry being prepared in one shop, and the wrought-iron portions in another preparatory to their being fitted together in a third shop, one side of which is monopolised by the roller-beam portions, and the other by the headstocks. The immense block of shops in which the work of this department is carried on is 363 feet long, and contains some hundreds of special boring, sawing, planing, and other machine tools, being also supplied with lifts and other appliances. The special machinery in this, as indeed in almost every other department, has, for the most part, been invented and manufactured by the firm to suit their own requirements. Forming a portion of this series of shops are store-rooms and packing-floors, the packing being conducted on galleries fitted with weighing machines, and appliances for lowering the cases to the trucks in waiting below. The "speed" department is also an extensive one, and there are rooms and shops, including the case-hardening shops, the brass-foundry and brass-fitting shops, the ring-spinning and doubling machine rooms, and the drawing offices.

The general offices of the company are in connection with the Hartford New Works, and form a very commodious suite of rooms. Over a hundred clerks are employed in the offices.

It ought to be mentioned that at the Werneth Spindle Works, which are some little distance from the chief establishment, Messrs. Platt Brothers & Co. keep about 1,100 workpeople employed in spindle and "fly" making, tin and copper working, and bolt-screw producing. The output of spindles at this branch establishment averages 35,000 a week, and that of bolts and screws 1,000 gross

The Hartford Old Works, situated at the other side of the town, as we have before mentioned, would in themselves form a fitting subject for a descriptive article, looking to the great extent of ground they cover, the immense amount of machinery turned out there, and the large number of workpeople (over 2,000) they provide labour for. Seeing, however, that the Old Works are, in the main, engaged in the production of similar machinery to that which is made at the New Works, and that the same healthy conditions of working, the same system of management, and the same unity of purpose prevail, it is not necessary that we should do more than make this passing reference to them. Mr. W. Richardson has charge of these works.

It is estimated that the firm pay about £10,000 a week in wages, and their works consume every year an average of 36,000 tons of coal, 12,000 tons of coke, 35,000 tons of iron, and 300,000 cubic feet of timber. And while we are on the subject of statistics, it will be of interest to mention that the total steam power used at the Hartford New Works is 8,000 horse-power; that 30 window-cleaners have constant employment the year round keeping the glass free to the access of light; and that 30 men are engaged in "sweeping-up." Messrs. Platt Brothers & Co. have left nothing undone in the way of rendering their works complete in every department. They have been thorough in all that they have attempted, and have always kept up that personal intercourse with their workpeople which tends so much to produce good feeling between employers and employed.

Since the Exhibition of 1851, which did so much to open the eyes of other nations to what England was doing in the direction of the production of machinery, there has not been a gathering of the kind at which the machines of Messrs. Platt Brothers & Co. have not held a foremost position. They have received medals without end. At Paris, Vienna, Moscow, Naples, Philadelphia, London, Bradford, Huddersfield, Edinburgh, and all other places where machinery has been exhibited, their ingenious inventions have commanded the attention of the manufacturing world, and to-day there is not a centre of industry in existence that does not know and use Messrs. Platt Brothers & Co.'s machines. One secret of the firm's success has been the complete organisation that has always prevailed in every part of the concern. The sub-managers of each division have an interest in the business, so that an interested supervision is obtained at all points. As has been well said by one who holds a prominent position at the Hartford New Works:—"Platt Brothers & Co.'s works form a chain of hundreds of links. Their organization, like their machines, works safely and correctly."

The present directors of the firm are: Mr. S. R. Platt (chairman), who has the general oversight of all the works, and has been twenty-three years connected with the firm; Mr. W. Richardson (vice-chairman), who has the management of the Hartford Old Works, the forge, the brickworks, and the various collieries, and has been connected with the business fifty years; Mr. W. F. Palmer, financial director, who has been connected with the business forty-three years; Mr. George Little, who is engaged in the direction of the Hartford New Works and Werneth spindle works, foundries, smiths' shop, and saw mills, tools, engines, and boilers, and has been connected with the business forty years; Mr. John Dodd, who has the management of the constructive and technical departments of the New Works, and has been engaged there thirty-three years; and Mr. John W. Nuttall, who is in the commercial department, and has a service record of thirty-one years. The secretary of the company is Mr. John Wynne, who has held the position since the incorporation of the firm as a limited company in 1868, and was previously associated with Mr. Palmer in the financial department for nine years. It may be questioned whether any other large limited company could show an aggregate length of service of managers equal to the above.

A few words regarding the special work upon which Messrs. Platt Brothers & Co. are engaged are due in conclusion.

The factory system, with its division of labour and the application of steam power to the driving of machinery, had been introduced into the cotton trade prior to the beginning of this business. It may also be said, that the principles on which the future system of machinery was to be constructed, had also taken definite form. The revolving card was already in operation. The system of drawing and doubling by the drawing frame was in operation, and slubbing and roving frames were in use, as well as the throstle for the warp yarns. The hand mule of Cromptons had settled the question of principle as regards mule spinning. Already several attempts had been made to "self-act" the hand mule; so that it may be said that the time was ripe for the advent of the constructive mechanician, who should conbine sound practical knowledge of materials best suitable for making cotton machinery, with sufficient appreciation of the special requirements of the cotton industry. Solid and durable construction, using *iron* rather than wood (then commonly used in all machines) wherever practicable, was the foundation on which the greatness of the concern has been built. From the first the best materials, and the most skilful labour, was put into all the products of the firm.

At first the efforts of the firm were engrossed on a few only of the preparatory machines, such as openers and carding engines, but gradually the whole range of the machinery used in spinning and weaving was produced.

At a very early period the firm began to introduce special tools for all pieces of machinery which were required in large quantities. Nearly every machine made by the firm had its own speciality of tools, so that planing and milling almost replace the chisel and file of the skilled mechanic. A vast amount of ingenuity and invention has been expended on the tools of the firm. The labour-saving power of these machines is enormous. Another important point in connection with the use of these tools is that the men and boys employed on them are what are technically known as unskilled labourers. This last remark applies also to the machinery in use in the moulding and smiths' shops. The result of this is great economy of labour, especially of "skilled labour."

One great result of the use of special tools has been the introduction of the system of making parts of machines interchangeable, which has proved a great factor in the success of the firm.

Formerly, and to a great extent at present, the business of textile machinery making was divided up into a considerable number of special trades. Thus, the rollers were made by the roller manufacturers; the spindles were made by the spindle makers; ring frame and throstle spindles and flyers were made by spindle and flyer manufacturers; the rollers used in mules and throstles by tin-smiths; bolts and nuts and many other parts of machines were manufactured by small concerns. This system had many drawbacks, among others want of uniformity and unreliability of delivery of goods, so that in busy times it often happened that some particular kind of work could not be obtained at the proper time or in sufficient quantity. There were also economical disadvantages attending this system. The efforts of this firm were early directed to remedying this state of things, and for a great number of years all these several businesses have been carried on at these works, to the great advantage of the business.

From the foregoing it will be understood that no special great inventions owe their existence to this concern, yet at the same time nearly every machine they make owes a great deal of its perfection and development to the constructors of

Hartford Works. A very large number of valuable patents bear testimony to the skill and inventive ingenuity of the managing principals of the firm. It is useless to describe in detail the great number of patents which are the outcome of the constructors; suffice it to say, that they are well understood and appreciated by the great industry which has used them.

In the first place, they may be said to provide all the appliances required in the equipment of a modern cotton mill. For the preparatory processes they produce, amongst other machines, what is known as the "Patent Double Macarthy Roller Gin," which accomplishes the separation of the cotton from all the dirt and impedimenta by which it may be accompanied when it is in its raw state. This machine is capable of cleaning 120 lbs. of cotton per hour. The machines of this class which Messrs. Platt Brothers & Co. are now making are a great improvement upon the original Macarthy machine, no entanglement of fibre or obstruction of action occurring. At each elevation of the moving knives, the grids, which are attached to the knives, lift the cotton to the level of the fixed knife edge and of the exposed surfaces of the rollers; and on the descent of each moving knife, the seeds which have become separated from the fibre are disentangled by the prongs of the moving grid passing betwixt those of the lower or fixed grid, about 750 times a minute, and are by this rapidity of action "flirted out." The "opener" is the next machine to which the cotton is submitted, and the name of the Crighton opener is given to one of the specialities in this line which Messrs. Platt Brothers & Co. make. It was invented at the time of the American Civil War for the treatment of the inferior descriptions of cotton which then made their way into the market. The cotton is fed into this machine and subjected to the action of beaters, and, air being drawn through the beating chambers at the same time, all the remaining impurities are extracted from the fibre, which emerges in a fleecy condition. An improved form of creeper-feeder is one of the latest additions to this machine, also a new opener called the "Exhaust Opener." Then comes the Lap machine, of which Messrs. Platt Brothers & Co. make several varieties, the object of the invention being to further clean the cotton and deliver it in the form of laps. Now it is the turn of the carding machine, of which the firm make several kinds, two of the more noticeable varieties being a self-stripping flat card and a roller and clearer card. These machines are either single or double ones, and are remarkable for the facilities they give for oiling and cleaning the various parts, and the protection they afford against accident, the double card for cotton being first introduced by the late Mr. Henry Platt. Then, for the finer qualities of cotton yarn there are combing machines, the one made by Messrs. Platt Brothers & Co. being Heilman's, which is considered the most perfect combing machine in the market. "Drawing" frames are the next in succession, and these the firm make with any required number of deliveries. Then follow Slubbing, Intermediate, Roving and Fine Roving Frames, all fitted with special cone drum arrangements, which give a higher velocity to the cone drum strap, and admit of large change wheels and fewer intermediate wheels being used, ensuring a more reliable and accurate adjustment of the winding apparatus, and securing a firmly-wound bobbin without danger of stretching the roving. The self-acting mule, with many recent improvements, and made of any number of spindles up to 1,200; the Ring Spinning Machine; the Wet Ring Doubler; and calico looms of every type are amongst the other machines for the manufacture of cotton that this firm make in such large numbers.

In the same way they go through the entire processes of the woollen and worsted manufactures, which though apparently very much akin require to be treated by a distinct class of machines. Messrs. Platt Brothers & Co. have introduced into this country with much success the French system of preparing and spinning worsted yarns. It would be impossible in the space at our command to give even a catalogue of the various machines made by this eminent firm. Sufficient has been said, however, to show that Messrs. Platt Brothers & Co. have a wider influence than any other firm in the providing of the necessary mechanism for the successful carrying on of the various textile manufactures at home and abroad, and that to their skill and energy is due in a great measure the pre-eminence of British machinery in all parts of the world where manufacturing operations are pursued.

SIR DONALD CURRIE.

SIR DONALD CURRIE.

"THE sea is England's glory," sings the poet, and the sentiment finds an echo in every Englishman's heart, for it is by the men who have gone "down to the sea in ships" that much of our country's greatness has been won. But the maritime renown of to-day is a very different thing from that of the past. In times gone by, the history of the sea was for the most part a matter of battle and adventure, and our boasted "wooden walls" knew far more of active service than do the "iron walls" of our own period. Britain's commercial navy took some protecting when the geography of distant seas was imperfectly understood, and warlike or piratical marauders were liable to intercept the progress of a vessel at almost any stage of its voyage. There was an uncertainty about all sea-going affairs that made shipping enterprises exceedingly difficult to engage in, and only men of heroic mould were capable of sustaining the strain and anxiety which such ventures entailed. Now-a-days, a steamship company can time the departures and arrivals of its vessels at various ports with almost as much precision as is observed in connection with a railway train, and should anything go amiss, there is never long to wait for particulars at headquarters, the telegraph lying ready for the transmission of news at every point which a vessel is likely to touch. Towards the close of the seventeenth century, it is recorded, "one of Edward Colston's ships, having been missing for upwards of three years, and having been given up as lost, arrived deeply laden. He said, as he had given her up as totally lost, he would claim no right to her, and ordered the ship and cargo to be sold, and the produce to be applied towards the relief of the needy, which was immediately carried into execution." Imagine a ship being missing for upwards of three years in these days! A ship that was missing for a sixth of that time, without news from her at one place or another, would be known, only too well, to have disappeared from all earthly cognizance.

A new order of "merchant adventurers" has arisen since the era of steam navigation set in. The kings of the ocean to-day are the heads of our steamship undertakings. The world's steam navy comprises about twelve thousand steamers, nearly one-half of which fleet belongs to Great Britain, while, in place of the juvenile sailing fleets of the pre-steam and iron epoch, there are now not less than fifty thousand sailing vessels ploughing the seas and assisting the commerce of nations in all parts of the globe. There is less of romance and more of actual business; less uncertainty, but greater responsibility, about the ventures of the sea now than formerly; and it may be questioned whether the men who made their names and fortunes by shipping speculations in the seventeenth and eighteenth centuries would have been at all equal to the larger demands which the enterprises of to-day make upon those who exert the controlling power in connection with the traffic of the seas. A single steamship company to-day possesses a greater tonnage of ships than a whole port could send out a hundred years ago.

It is nearly eighty years ago since Fulton was experimenting on the Seine with the model steamboat to which he was trying to apply the new motive power that James Watt was utilizing with so much success in another direction, but it is not more than half that period since ocean-going steam ships came to be accepted and believed in as a practicable development of that mighty force. To Victor Hugo, the little steamer, which in the early years of the century began to ply on the river in Paris, was simply "a thing which smoked and clacked on the Seine, making the noise of a swimming-dog," and "went and came from the Tuileries to the Pont Louis Quinze—a machine good for very little; a nightmare dream from Utopia—a steamboat!" On the Thames and the Clyde steamers formed an interesting curiosity in the second decade of the century, and the first development of steam enterprise in the *James Bell* and the *Comet* gave the Clyde the starting impulse for the construction of such vessels, but it was not until some years later that anyone was found daring enough to take a steamboat upon the ocean. Regular steamship traffic between this country and the United States was established in 1838, and up to that time the ocean voyages of steamers had been few and far between, being regarded more as matters of daring and adventure than serious attempts to bring into operation a new power. The first steamer to cross the Atlantic was the *Savannah*, which was from the 25th of May to the 20th of June, 1819, in making the trip; in 1825 the first steamship voyage was made from England to India; in 1833 a second steamer braved the storms of the Atlantic, the *Royal William* leaving the port of Quebec on the 18th of August in that year, and reaching Gravesend on the 11th of September. Then there was another long interval, but in 1838 several ocean steamship ventures were undertaken, and from London, Bristol and Liverpool steam-propelled vessels were sent out. The *Sirius* crossed from London to New York in seventeen days; the *Great Western* from Bristol to New York in fifteen days, and a second *Royal William* from Liverpool to New York in nineteen days. Then it was that the public began to take a real interest in the question of ocean-steamer traffic, and the doubters and denouncers to cease their croakings. The problem had been solved, and it now only required the effective alliance of the projector and the capitalist to establish steamship communication between all the nations of the world. One of the first to take advantage of this opportunity was Mr. Samuel Cunard, who came to England from Nova Scotia in 1838, and, in conjunction with Mr. Robert Napier and Messrs. Burns of Glasgow, and Messrs. MacIver of Liverpool, established the famous Cunard line of steamers, beginning operations on the 4th July, 1840, by the sending forth from Liverpool to Boston of the *Britannia*, one of four vessels of 1,200 tons burden and 440 horse-power, which Mr Napier built for the Cunard Company. From that time to this the ocean steam service has gone on expanding at a remarkable rate, until, instead of the half-dozen ocean steamers or so, that were all the world owned about a quarter of a century ago, we have now, as we have before stated, a steam navy of twelve thousand vessels, and from every port and over every sea the vapour-flag, which men of the stamp of Fulton and James Watt set flying, makes its way and achieves its triumphs.

In the building up of this great navy, by which the progress of nations and the work of civilisation have been so brilliantly helped forward, many bold and energetic spirits have been required; but, happily for the world, the need for men of commanding ability generally brings them forth. So it has been in a remarkable degree in connection with the formation and working of our leading steamship lines. Indeed, only men of high administrative ability, and possessed of keen commercial insight, could hope to succeed, where the responsibilities were so heavy, the risks and dangers so great, and the conditions so involved. In other articles of this series we have indicated the part which some of these steamship pioneers have played in the transition from wind-driven to steam-propelled ships, and we now allot ourselves the interesting task of tracing the history of the founder of the Castle Line of Mail Packets, Sir Donald Currie, who has been more or less connected with the business of steamer traffic since the time of the establishing of the first line of English ocean steamers.

Donald Currie was born at Greenock in 1825, and began his business career at that place in the office of a shipowner. After learning the rudiments of his profession there, and imbibing a strong enthusiasm for everything relating to the sea, he was tempted, at the age of eighteen, to migrate to Liverpool, where shipping enterprise was on a much more extended scale than in his native Scottish port. Liverpool was the English El Dorado in those days to youthful minds of commercial bent. It was famous for its merchant princes, its wonderful cotton-carrying trade, its miles of docks, and, now that Samuel Cunard had shown the way to a newer fame, for its steamships. The Rathbones, the Gladstones, the Ewarts, the Horsfalls, and the Croppers, had all made their fortunes in business on the banks of the Mersey; and there was one Liverpool merchant, William Brown, who, in the one year, 1836, four years before the sailing of the first Cunard steamer, had done business to the enormous extent of £10,000,000, and if these things could be accomplished when steamships did not exist, how much more was Liverpool not capable of doing with the new power at its command to accelerate its business transactions? It may be that young Donald Currie's ambition did not at that time soar to the lofty heights upon which these Liverpool magnates sat enthroned; but the commercial instinct was strong enough within him to make him desire to associate himself in some honourable way with the active business life and later enterprises of the great seaport, so thither he betook himself, and in no very long time succeeded in receiving an engagement, by which there was opened out to him just such chances of promotion as he had the capacity to seize and hold. By one of those rare strokes of luck which seem to follow an earnest Scotsman in his southern pilgrimages in search of fortune, he happened to attract the notice of the managing partner of the newly-formed Cunard Company, and was given a position on their staff. Nothing could have been better. Here he was tacked on to an undertaking which represented the latest and most important development of maritime speculation. For a few years he was permitted to watch and aid in the rapid growth of the company's prosperity, to see ship after ship of ever-increasing power added to its fleet, and to busy himself with a multitude of business details which always kept him abreast of the times. His own fortune improved with that of the company, and when, in 1849, on the abolition of the Navigation Laws in this country, and the recognition of the principle of reciprocity by the United States, it was deemed expedient to enlarge the sphere of the company's operations by establishing a new line of steamers between Havre and Liverpool, Donald Currie received the appointment of special agent at Havre and Paris of the Cunard Company. British steamers in those days could not import into America any goods of foreign manufacture, and it was not until the abolition of the British Navigation Laws that the United States reciprocated by the abolition of theirs, admitting English ships with French and Continental goods into their ports upon the same footing as British goods. The competition for the Atlantic traffic was very severe in those days; but the Cunard Company were not to be driven into accepting a secondary position. It was thought that by putting on a line of steamers between Havre and Liverpool, the monopoly which the American steamers had previously enjoyed of the direct traffic between France and the States, might be broken down. And so it proved, for the Cunard Company's Havre steamers, from that day to this, have conveyed a large proportion of the goods which

France has had to despatch to America, notwithstanding the fact that the Cunard traffic has had to be done by way of Liverpool. At the same time, a good deal of direct French and English traffic has been acquired by the company, and the foundations of success which Donald Currie laid during the six or seven years of his active and zealous service at Havre, have been found firm and broad enough to form an important and profitable business superstructure upon. During these few years at Havre, when a large share of the responsibilities of management devolved upon him, his administrative capacity found an ample field of exercise, and he was enabled still further to master the details of steamship working, especially in regard to the attraction of fresh business. He formed a net-work of communication between Havre and the principal towns of France, and, by the energetic action he kept up, made the name of his company famous amongst French, Belgian and German traders with America, extending the steamer services to Antwerp and Bremen.

About 1856 Donald Currie returned to Liverpool, in order to assist once more in the direction of the Cunard Company's affairs at headquarters. He left his brother, Mr. John Martin Currie, in charge of the Havre agency. From that time down to 1862, Donald Currie continued to hold a prominent position in connection with the company at Liverpool, and devoted his best energies to the furtherance of their interests. But in the year named he conceived the idea of establishing a line of ships of his own, not in opposition to the company whom he had served so faithfully for the long period of twenty years, not with the view of in any way taking advantage of business connections which he had himself helped to form on behalf of the company, but with the sole object of building up a shipping concern of his own on fresh and independent lines. He did not attempt to open up communication with Havre, where he was so well known, nor with America, with which country he had had such extensive and intimate dealings while in the Liverpool office. He found other worlds to conquer, and he conquered them. Doubtless he had for a considerable time contemplated this step, and before he ventured to quit his moorings, had well thought out his plan of action, and calculated his chances of success.

It was not in his nature to plunge, neither was he to be moved from his purpose when he had once satisfied himself that a certain course was the correct one to take.

First of all he established the "Castle" Line of sailing ships between Liverpool and Calcutta, and for a time worked very cautiously. He looked forward to the period when he would be able to run steamers as well as sailing vessels, but, for a start, the latter were sufficient. Before then, sailing ships had been about as irregular, in regard to their dates of departure, as they were in regard to their arrivals, but, with his new line of vessels, Donald Currie adopted the plan of sending his ships to sea on fixed advertised days, which caused his rivals to bestir themselves, and scored a distinct point in his favour. His Castle Line proved a success, and, after two years of prosperous working, he found it more convenient to make London his port of departure, the fact that his vessels mostly returned from India with cargo intended for the metropolis, making it to his advantage to effect this change.

Now, he "began to feel his feet," as the north-country men say. He had passed the creeping stage, and might now venture to walk—perchance to run. So he turned his thoughts towards steam. He had been connected with steamships pretty well all his life, except this one short sailing-ship interval, and it was not likely, with his wide knowledge and experience, he would long be content to sail when he might be steaming. His native shrewdness, however, never forsook him ; bold and courageous he might be, but, above all, he could not afford to be reckless. A partnership in the Leith, Hull, and Hamburg Steam Packet Company, therefore, satisfied his steamship yearnings for a time, this company being one of the most important shipping associations in Scotland. He also became interested in a line of steamers which he started to sail between Liverpool and Hamburg, of which his firm had the management.

It was not until 1872 that Donald Currie resolved upon the undertaking with which his name has been ever since closely identified—the establishing of the famous Castle Line of steamships between England and South Africa. Keenly observant of the development of social, commercial, and political progress in different parts of the world, he had not failed to notice that the Cape

Colony gave indications of vitality and prosperity which promised in the near future a much stronger link of connection with the mother country than had previously existed. The time was favourable, therefore, he thought, for a new line of steamers being formed to assist in the work of South African colonization. How far his expectations came to be fulfilled may be gathered from certain remarks which Sir Donald let fall in 1883, eleven years after, on the occasion of the launching of the *Hawarden Castle.* "In 1872," he said, "I thought the Cape Colony would have a future, and it was given to me to assist in the development of that future—a development, it is surprising to know, which was marked by this singular feature, that in 1872 the ships which were carrying Her Majesty's mails between England and Cape Town measured 1,400 to 1,750 or 1,800 tons, while the vessel just launched measures 4,200 tons. The average steamers of that day carrying mails was 1,700 or 1,650 tons; to-day the average is largely over 3,000 tons, and while the two companies now carrying the mails had between them ten years ago, when the Castle line was commenced, somewhere about 17,000 tons of shipping, the Union

Company and the Castle Packet Company, carrying the mails this day, own between them 100,000 tons. That marks the material prosperity of the colony and of South Africa, and if that country—I mean all South Africa—has peace and quietness, its material, social, and commercial progress in the future is assured."

But, although much has happened that the projector of the Castle Line can never have contemplated, and he has been, by the accident of his position, drawn into many contentious encounters away from the common scope of steamship operations, the general result of his enterprise cannot but be regarded as eminently satisfactory. The first battle he had to fight was in opposition to a monopoly, as he had fought against one at Havre, only this time it was on his own behalf and in antagonism to an interest that had powerful Parliamentary support. The Union Steamship Company claimed the right to continue the conveyance of the mails between this country and South Africa, but the new service inaugurated by Donald Currie becoming so popular, and the ships engaged in it being at least equal to those of the older line, he maintained that the interests both of the colony and of England demanded such an increase of mail service as the two companies together would be enabled to effect. His exertions to procure this concession from the Government met with much sympathy in business circles, and the agitation received such marked support throughout South Africa that, in 1876, the Cape Parliament passed an unanimous resolution that the mail service should thenceforward be equally divided between the Union Steamship Company and Mr. Donald Currie's firm. The Castle Line fleet has gone on increasing year by year since its formation in 1872 and now comprises something like a score vessels, some of them being amongst the finest steamers afloat. The three largest ships of the service are the *Norham Castle*, the *Hawarden Castle*, and the *Roslin Castle*, each of which is of 4,300 tons, and are all of the same construction. Next, in order of tonnage, come the *Pembroke Castle* (3,950 tons), the *Drummond Castle* (3,705 tons), the *Garth Castle* (3,705 tons), the *Grantully Castle* (3,489 tons), the *Conway Castle* (2,966 tons), the *Warwick Castle* (2,957 tons), the *Dunrobin Castle* (2,811 tons), the *Dunbar Castle* (2,700 tons), and the *Methven Castle* (2,700 tons). All these twelve steamers belong to the South African service, and every fortnight one or other of them sails from London, as well as from Durban and Cape Town. In addition to these powerful and beautifully equipped steamers, there are seven vessels retained for what is called the Inter-Colonial Service. These are the *Taymouth Castle* (1,827 tons), the *Duart Castle* (1,825 tons), the *Courland* (1,241 tons), the *Dunkeld* (1,168 tons), the *Melrose* (840 tons), the *Florence* (695 tons), and the *Venice* (511 tons). The steamers for South Africa leave the East India Dock Basin, Blackwall, every alternate Wednesday, and Dartmouth on the following Friday, proceeding alternately *viâ* Lisbon, and *viâ* Madeira. The steamships calling at Lisbon connect with the Mauritius and East African service, and once every eight weeks a steamer calls at St. Helena and takes passengers for Ascension. The Inter-Colonial steamers provide frequent communication between the various ports on the South African coast, and also between those ports and East Africa, Mauritius, Madagascar, India, China, and Australia.

It says much for Sir Donald Currie's energy, judgment, and power of organisation, that in the comparatively short space of time that has elapsed since 1872 he has been able to put upon the ocean and engage in active and profitable employment, such a noble collection of steamers as we have mentioned. Probably not another instance of such rapid growth could be quoted in the entire annals of steamship enterprise. And when we also take into account the fact that during a great portion of this period South Africa has been laid under the terrible scourge of war, our wonder at his achievements is all the greater; but being possessed of the happy faculty of adaptability to circumstances, and knowing well how to seize upon and utilise exceptional or accidental occasion,.he has been able to turn what to others might have been loss and disaster to advantage. Several instances of this description occurred at the time of the Zulu troubles. From the first, Sir Donald seems to have put himself in sympathy with the colonists and the natives of South Africa, and so far as their aspirations and efforts were in harmony with true justice, was in accord with them. It was only when they took upon themselves to make excessive demands and to attempt to carry their arguments by the force of arms that he separated himself from them, and even then he often was compelled to assume the position of mediator. He was brought into friendly relations with the leaders of the various South African communities long before a collision had occurred between them and the representatives of the Imperial power. He had a personal acquaintance with President Brand, of the Orange Free State, and entered into successful negotiations with him on behalf of the Home Government, for the settlement of England's dispute with that Republic relative to the ownership of the Diamond Fields and the boundaries of the Free State. The services he rendered on that occasion were duly recognised, for Her Majesty, upon the advice of Lord Carnarvon, then Secretary of State for the Colonies, in May 1877, conferred upon him the decoration of Companion of the Order of St. Michael and St. George, and the Volksraad of the Orange Free State accorded him an unanimous vote of thanks.

Following Sir Donald further in his connection with the political complications which subsequently ensued in South Africa, we find that in the same year he was called upon to perform certain friendly offices on behalf of the Boers of the Transvaal. The annexation of the Transvaal by Sir Theophilus Shepstone took place in April 1877, and in the month of August of that year, Messr. Krüger, Jorisson and Bok were sent over to England as a deputation to protest against the annexation. On their arrival in this country they requested the assistance of Sir Donald Currie. Only a short time previously Sir Donald had received as his guest the Hon. J. Burgers, the then President of the Republic, and had introduced him to the Secretary of State for the Colonies. It was natural, therefore, that the three delegates should turn to Sir Donald as to a tried friend. Without taking upon himself to make any formal expression of opinion upon the question at issue, he introduced the deputation to the Colonial Secretary, the Earl of Carnarvon, and got them a hearing, and he was present at the subsequent interviews. The delegates pleaded their cause with much eloquence, but the Government finally declined to retreat from their position, and Messrs. Krüger, Jorisson and Bok had to return to South Africa without having attained independence, which was the object of their mission, but taking with them from the Government such friendly assurances as it was hoped would satisfy the population of the Transvaal. But the Boers were not disposed to let the matter rest as it was. They conceived they had been wronged, and were determined to leave no stone unturned to gain a reversal of the edict of annexation. Accordingly, the next year saw a second deputation from the Transvaal in England—Messrs. Krüger, Joubert and Bok. They arrived in July 1878, and their old friend Donald Currie again officiated as the medium of introduction. Sir Michael Hicks-Beach was now at the Colonial Office, but, although the delegates showed themselves to be in the most desperate earnest, and, by respectful memorial and powerful personal appeal, advocated their cause, but little hope was held out to them of their prayer being acceded to; indeed, Sir Michael went so far as to express his surprise that the question should have again been submitted to the Home Government, after the previous year's refusal to entertain the subject. Strongly impressed with the danger of the situation, Sir Donald Currie took upon himself the responsibility of addressing a letter to Sir Michael Hicks-Beach on the matter. As this communication almost assumes the importance of an historical document, and throws a good deal of light upon Sir Donald's character and motives, we cannot do less than quote certain extracts from it as it appears in the Blue Book on South African Affairs which the Government published in 1881.

The letter is dated the 19th July, 1878, and begins in the following words: "Sir,—Referring to the letter which I had the honour to address to you, marked 'confidential,' on the 10th inst. with regard to the Transvaal and Delagoa Bay, and to the interview which you favoured me with on the 15th inst., and bearing in mind what passed at your private meeting with the delegates yesterday, I now submit the following observations, as I promised to do, in the interest of the peace and prosperity of the Transvaal, and with the hope that they may be considered of some value to you in judging how Her Majesty's Government will deal with the proposals of Messrs. Krüger and Joubert. As matters stand it would seem as if there were only two courses open; either to maintain British sovereignty or to yield to the claims of the delegates for independence. But if you incline to seek for some arrangement fitted to reconcile the Boers, a third course may be found.

"From all I can see, after long interviews with Messrs. Krüger and Joubert, and inquiries which I have made, it appears to be extremely probable that an absolute and unconditional refusal of the memorial from the inhabitants of the late South African Republic will be followed by scenes of disorder and possibly of bloodshed; and, further, that the country will be disorganised, as many people will *trek* out of the territory; that there will be difficulty in collecting taxes, settlers and intending emigrants may be alarmed, commercial relations disturbed, and all progress hindered for many a day to come in the Transvaal; consequently, that we may have to look for great financial embarassments, both for the people and for our Government, in the revenue and expenditure. The Boers are so persuaded of the injustice of the course which has been pursued (whether rightly or wrongly), they have so strong a disposition to freedom and liberty of movement, they are so religiously, or, as some would call it, superstitiously, mindful of facts in their past history, that they will sacrifice their property and risk their lives, as they have often done before, for their convictions and what they deem to be their just rights."

From this Sir Donald went on to argue that a third course was open, and he suggested that, "first of all, the Queen should be accepted cordially by the Transvaal Boers as the supreme head;" that the people should elect their own representatives, and that the Imperial Government should nominate a few members, and the Parliament appoint its own chief administrator "under a constitution framed with the approval of her Majesty's Government." In any case, however, he considered that the Transvaal should be "in strict alliance with England, and under its protectorate." He besought the Government to treat the Boers as if they were our brethren, and not to make them feel the yoke of subjection. How well Sir Donald understood the temper of the people for whom he had undertaken the office of spokesman, and how accurately he gauged the position, is attested not only by the counsel he tendered on that occasion, but by the course of after events. He concluded the memorable letter to which we have referred with the following words of advice: "It would be easy to stir up angry feelings in their recollection of what the Boers have always considered to have been injurious treatment at the hands of persons who held official positions; but, instead of antipathies and discord, we might, by good and kindly dealing, secure their strong attachment to this country, and, in time, clear away prejudices which prevail amongst them, owing to our action with regard to the Diamond Fields, and our dealings in the previous history of the Transvaal and Free State. At present the population is largely composed of the Boers; but many Englishmen hold land there, and the country would soon be settled to a considerable extent, if fair prospects of peace and goodwill existed. And there is one very important condition which might with perfect fairness be included in the Constitution, viz., that at any time a majority in the country should have the power to decide upon annexation to England.

"The Boers have a strong conviction of the justice of a decision by a majority, and they would recognise, I believe, some such arrangement, just as they would now accept the decision to be annexed to England if a majority of qualified voters could be found in the Transvaal willing to vote for the maintenance of the present condition of things."

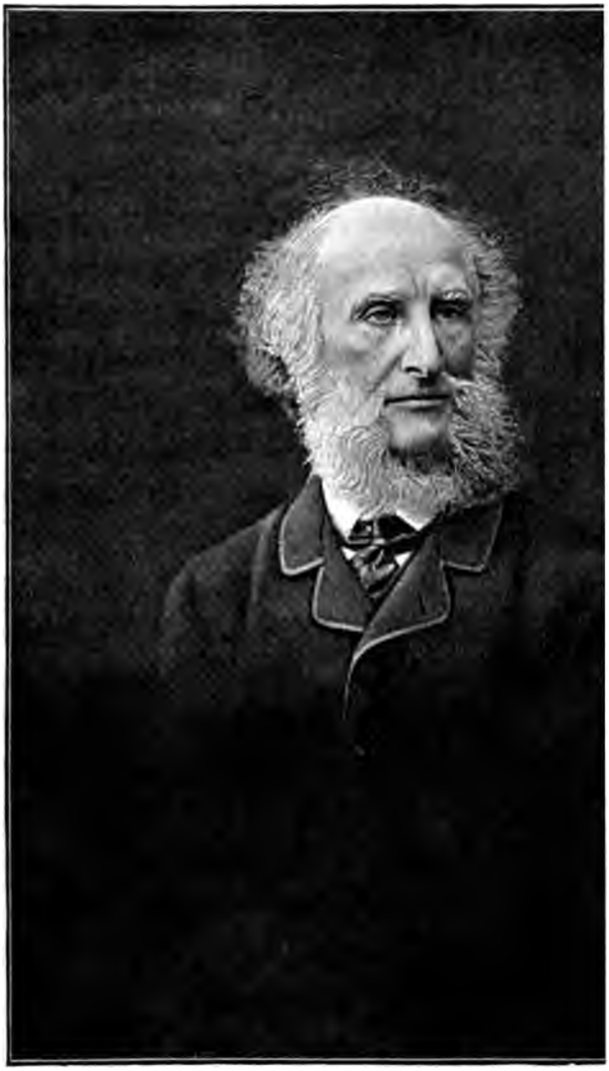
Such a letter as this seemed more akin to statesmanship than seamanship It showed the steamship proprietor in a new character, and no doubt did much to advance his reputation as a public man. After all, it might have been best to have adopted his reading of the horoscope. He comprehended the signs and tokens, and did his best to give them faithful interpretation. What actually took place is well within the recollection of Englishmen. On the 15th of August, 1878, Mr. Courtney brought forward in the House of Commons a motion for the restoration of the independence of the Transvaal, and the question was made the subject of a long debate. Sir Michael Hicks-Beach, on behalf of the Ministry, expressed anxiety that, as far as possible, self-government should be given to the people of the Transvaal, yet avowed the determination of Her Majesty's Government to maintain British sovereignty.

The delegates were present and heard this declaration. They saw they had nothing further to hope for, and returned to the Transvaal without a moment's delay telegraphing to Sir Donald Currie their farewells, he at the time being in Scotland expecting them to visit him. Shortly after their return, the Boers broke out in open rebellion, and it was not until there had been much bloodshed that order was restored. At first, the rebels were successful against small bodies of British troops, then our forces were increased, and the rising would have been speedily quelled, but the Government, after Majuba, appointed a Commission to meet the Boer leaders, and decided before going further to yield the country to the Boers, subject to certain regulations, very similar to those laid down by Sir Donald Currie, for recognising the British Crown as the supreme head of the Constitution. No wonder that a leading continental journal, the *Cologne Gazette*, should make the remark, after the publication of the Blue Book containing Sir Donald Currie's letter, that "if the English Government then in power had paid even the most superficial attention to these suggestions, England might have been spared an unnecessary war."

Fresh troubles arose in South Africa in the Autumn of 1878, and Sir Donald Currie was again called upon to perform duties which were of a semi-official character. War was declared against Cetewayo, the Zulu king, on the 4th of January, 1879, the task of enforcing the British demands being entrusted to Lord Chelmsford, then commander of the army in South Africa, and on the 11th of January the English forces crossed into Zulu territory. On the 22nd of the same month occurred the terrible disaster of Isandhlwana, when a portion of No. 3 column of the British troops, consisting of six companies of the 24th Regiment, 104 mounted men, and about 800 natives, commanded by Colonel Durnford, was attacked by an overwhelming number of the enemy, and, despite a most gallant resistance, the detachment was cut to pieces. This painful intelligence, which cast a gloom over the entire country, relieved only by the story of the brilliant defence of Rorke's Drift on the night of January 22nd, by a handful of British soldiers under Lieutenants Chard and Bromhead, was conveyed from the Cape by the *Dunrobin Castle* of the Donald Currie fleet. The steamer was despatched from Table Bay on January 27th (a day before her appointed time of sailing), with special orders to proceed with all speed to St. Vincent, Cape Verde Islands, and there telegraph the sad news forward to London. These instructions were faithfully carried out, and the intelligence was communicated to the Government and the press by Sir Donald Currie early in the afternoon of the 10th of February.

Immediate reinforcements were now necessary, and the Castle steamers were at once placed at the disposal of the Government. The news of the Isandhlwana disaster was received on the Tuesday, but, as the *Conway Castle* had sailed for the Cape on the previous Friday, it seemed that four days would be lost before the despatch of the next mail packet, on that day week. In this emergency, Sir Donald telegraphed to Madeira, to the *Conway Castle*, with instructions for the vessel to proceed to St. Vincent, four days nearer the Cape, and there wait further orders. In the ordinary course, the ship would not have touched at St. Vincent at all. By this move, four days were secured to the Government for making their arrangements respecting reinforcements, and they were enabled to forward news to Lord Chelmsford of the forces that were being despatched to his relief, in time for him to countermand the orders previously given, that the garrison of Ekowe should go out to meet a relieving force of 500 men, under Colonel Law, from the Tugela. The beleaguered garrison received this important intelligence on the very day that had been fixed for them to start on a perilous march of twenty miles, which would have meant certain annihilation to them, for, as it afterwards turned out, Dabulamanzi, with 15,000 Zulus, was lying in wait for them in the expectation that they would risk the sortie. Subsequently Lord Chelmsford was enabled to march upon Ekowe with a relieving force of 3,000 men, part of which consisted of the troops conveyed by the *Dublin Castle*, dispatched to South Africa within three days of the news of the disaster. On this occasion Lord Chelmsford defeated the Zulu impi at Gingholovo, and safely effected the deliverance of the besieged troops.

For a time, all eyes were turned towards Zulu land, where British over-confidence received some serious lessons, and in the end the savage enemy were reduced to subjection. But it was a hard and a difficult task, made all the more so by the ignorance which prevailed in England concerning the nature of the country the English troops had to fight in, and the strength and resources of the foe with which they had to battle. At such a time it was natural the Government should have looked to men like Donald Currie for help. This he most readily granted, and, during the whole of the Zulu campaign, the steamers of the Castle Line rendered most effective service in the conveyance of troops and military stores from England to South Africa. In the transmission of news, too, these powerful ships were of great use, Sir Donald keeping them in regular and rapid communication across those portions of the ocean to which the telegraph system did not extend. The eagerness with which the authorities and the general public awaited the arrival of the news that the Castle steamers brought from Capetown to Madeira or St. Vincent, and thence transmitted by cable to England, testified to the importance of the service at that critical period, while demonstrating the necessity that existed for direct



SIR DONALD CURRIE.

telegraphic communication between England and the South African colonies. The formation of such a chain of connection had often been urged upon the Government by Sir Donald in times of peace, and, now that the inconvenience of its absence had been so forcibly shown, the demand for it could no longer be resisted, and, before the Zulu war was brought to a conclusion, direct telegraphic intercourse had been established by the extension of the cable from Aden to Natal.

Other matters of public interest had engaged Sir Donald's attention during the period over which we have glanced. Towards the end of 1875, he was elected chairman of the committee appointed to represent the shipowners of the United Kingdom in dealing with the proposed changes in the laws affecting the mercantile marine, and took a prominent part in the discussions which resulted in the amendment of the Merchant Shipping Acts by the Government of the day. The subject of maritime warfare also attracted his thoughts to a considerable extent, and, in March 1877, he was prevailed upon to deliver a lecture on this important question, at the Royal United Service Institution, Whitehall, on which occasion the chair was occupied by Lord Wolseley, then Lieutenant-General Sir Garnet Wolseley. This lecture displayed a wide acquaintance with the subject, and was full of information and suggestion. It advocated the establishment of coaling stations and graving docks at various points of our extensive possessions, and the connection of our colonies with the mother country, by a complete system of telegraph lines. "It is all very well," he said, "to spend £400,000 or £500,000 in building an ironclad, and to give such a vessel powerful guns, but if her commander is unable to manœuvre with a certainty that he can communicate with the authorities at home, or take advantage of an alternative route; or, if placed upon a South Atlantic station, that he can watch the enemy's fleet or cruisers along the Brazilian coast, or along the coast of Africa, or in the Indian Sea, with the certainty that he has the opportunity of repairing his damage after a struggle, what encouragement or confidence can he have?" He then proceeded to picture the disasters that might befall English vessels of war in certain situations and under certain conditions, and, as a contrast, gave imaginary, carefully thought-out illustrations of the advantages that would accrue by the adoption of the precautionary measures which it was the main purpose of his lecture to set forth. After the subject had been thus eloquently ventilated, a discussion took place upon it, which was taken part in by Admiral Sir William King Hall, K.C.B., Mr. Robinson (a member of the Natal Legislature), Captain Fremantle, R.N., Admiral Selwyn, and Captain R. A. E. Scott, R.N., the debate being wound up, in a speech expressing strong approval of the lecturer's views, by Sir Garnet Wolseley.

Three years later, on the 5th of March, 1880, Sir Donald Currie delivered a second lecture at the Royal United Service Institution on the subject of Maritime Warfare, in which he urged the advisability of adapting ocean steamers to war purposes. He argued that merchant steamers, if of suitable speed, might be most usefully employed—first, as mail packets in time of war; second, as offensive cruisers; third, as cruisers on the defensive; fourth, as despatch vessels attached to a squadron or naval station; fifth, as transports; and sixth, as gun-boats or store-ships. Furthermore, he explained how all this could be effected, and showed the additional power that would thus be imparted to the naval branch of the service. "An immense additional advantage," he said, "by way of strength to the Royal Navy, and to our maritime power, would be drawn from this union of the mercantile marine with the Royal Navy in the event of war. At present there is so much jealousy between the services that naval officers cannot get employment in merchant shipping to the extent to which their merits entitle them. The captain or officer of a merchant ship has no chance of joining the Navy; but this interchangeableness or harmony of action would engender such feelings of mutual sympathy and support as would present a power of vital energy and patriotic vigour such as Russia, France, or Germany can never be expected to display. Such an employment of our Auxiliary Force would secure occupation to worthy and able naval officers. Each steam company, whose steamers were engaged by government, would require officers, and the Admiralty would also be compelled to avail themselves of their services. I have often heard, with regret, able officers of the Navy, who are anxious for work, lament their constrained idleness. Some such employment as I have just indicated would afford them opportunities for active and useful exertion, and the extra cost to the country would not be equal to the cost of wear and tear of a small ship of war. I see another advantage in the regular employment of naval officers in connection with the merchant service, namely, the experience which such officers would gain." He concluded by saying that it was for this country to make suitable arrangements in time to protect our dominions both at home and abroad, and was of opinion that that could only be secured by a comprehensive union of our national forces, of which not the east was the British mercantile marine. He was satisfied that when the time of danger came, the mercantile marine of this country, judiciously employed, would have the spirit to respond, as it had the power to be equal, to any claim which might be made upon it. The Marquis of Lansdowne presided on this occasion, and the lecture was followed by a most interesting discussion, which was continued at the next meeting of the Institution, and in the course of which the lecturer was highly complimented. At the close of the debate the noble chairman said: "I am sure I shall have the permission, not only of the Council of this Institution, but of every member of it, and also of the public, to thank Mr. Donald Currie for the trouble which he has taken in preparing and reading this admirable paper. He has brought to bear upon his subject a great amount of practical knowledge and experience, and an acquaintance with details which has manifested itself not only in the paper itself, but in the reply to which we have just listened. I ask you, therefore, to permit me in your name, to thank him cordially for the honour he has done us."

Sir Donald Currie's lecture made a deep impression at the time, and was much commented upon. Nor did it fail to bear good fruit. Since then the Admiralty have been at the cost of having a number of the most powerful steamers in the merchant service fitted as cruisers, and there is no doubt that, in the event of England being engaged in a war, these would prove of great assistance. Already some of them have done good work, and, although temporarily restored as merchant steamers, they could readily be re-adapted to any requirements that an outbreak of hostilities might put upon them. In the recent preparations for the contingency of war, following the Penjdeh incident, the Government made arrangements for carrying out the suggestions which Sir Donald Currie made in his lecture on Maritime Warfare, by providing guns at different strategical points—the Cape, Hong Kong, and elsewhere.

It was natural that one who filled so conspicuous a position as Sir Donald Currie, and was held in such public regard, should be solicited to enter Parliament. He was in 1878 brought into close relations with the working classes of Glasgow and Greenock, and in his endeavours to bring to a favourable termination the strikes and lock-outs which were then seriously imperilling the northern ship-building industries, became very popular. On the resignation of Mr. J. J. Grieve, as member for Greenock in 1878, Donald Currie was induced to become a candidate for the representation of his native town; but, in spite of having the popular feeling on his side, a division in the Liberal camp and the action of Mr. Parnell sufficed to secure his defeat. He had not long to wait, however, for a more favourable opportunity. At the general election of 1880 he was invited to allow himself to be nominated in the Liberal interest for the representation of Perthshire, and consented to stand. He was opposed by the former member, Colonel E. Home Drummond-Moray, a Conservative, and a very spirited contest took place, resulting in Sir Donald Currie's return by a majority of 292 votes over his opponent. From that time to the present the eminent shipowner has continued to sit in the House of Commons in connection with the representation of Perthshire, electing to sit for the western section of the county since its division into two distinct constituencies. Sir Donald has proved, as was to be expected, a most useful and efficient representative. He has been in the main a supporter of Mr. Gladstone's policy, but on the Home Rule question, on which he fought for and won his seat again at the last general election, he found it necessary to separate himself from his leader, even though between Mr. Gladstone and Sir Donald there exists a strong personal friendship. On more than one occasion has the ex-premier availed himself of generous invitations which Sir Donald has given him to join in a cruise round the coast. In July 1877 the *Dublin Castle* conveyed Mr. Gladstone and a select party from London to Dartmouth, and much public interest was manifested in the trip. Again, in August 1880, the right honourable gentleman and a number of friends accompanied Sir Donald on a cruise in the *Grantully Castle*, on which occasion several ports on the south coast were visited, and from Falmouth they proceeded to Kingstown, Mr. Gladstone taking advantage of the opportunity thus afforded him of visiting the Irish metropolis. Next the voyagers steamed away to the Clyde, and thence to Oban, Tobermory, and Skye, from which point the vessel passed through the Pentland Firth, and down the east coast of Scotland to the Firth of Forth, Mr. Gladstone making a call at Edinburgh. After a cruise of about eight days the *Grantully Castle* reached Gravesend, and her distinguished passengers landed, having reaped great benefit from the delightful and invigorating trip they had had through the kindness of the owner of the ship.

Sir Donald Currie was made the recipient of honours innumerable in recognition of the good work he performed in so many ways. The Council of the Society of Arts conferred upon him the Fothergill gold medal in May, 1880, "for the improvements introduced by him into his passenger steamers, having for their object the prevention of loss of life at sea from fire or accident." In the same month he was appointed a Deputy-Lieutenant of the City of London. Then, in connection with services rendered by him to Malta, having regard to questions of education, taxation and emigration facilities, he received the united thanks of the Governor and Council of the island, as well as of the Home Government. He has visited Malta several times, and has always taken a warm and intelligent interest in the welfare of the little community there. The honour of knighthood, in the order of St. Michael and St. George, was conferred upon the member for Perthshire in July, 1881, in recognition of the public services rendered by him in connection with the Zulu War, and especially in connection with the relief of Ekowe. Shortly after this event he took a leading part in the opening of the new Edinburgh Dock at Leith, in the prosperity of which port he has for many years been deeply interested. His Royal Highness the Duke of Edinburgh performed the opening ceremony, and there was a large gathering of members of Parliament and other distinguished visitors. The ceremony took place on the 26th of July, 1881, and on the previous evening Sir Donald had the honour of entertaining the Duke of Edinburgh, Prince Henry of Prussia, the commanders of the fleet, and many other personages of distinction at a banquet on board the *Garth Castle*, when his Royal Highness, in proposing the health of the host, congratulated him upon the honour which had just been bestowed upon him, and referred in appreciative terms to the assistance which Sir Donald had been enabled to render on various occasions to the naval and military services of the empire, briefly recounting, as a matter of lively personal interest to his Royal Highness, the saving of the Naval Brigade from an unnecessary struggle at Ekowe, by the promptitude with which the news of the despatch of reinforcements had been transmitted from England to the Cape by Sir Donald, as already described. The dock was successfully opened on the following day, and has already proved a valuable addition to the trading facilities of the port. Mr. James Currie (Sir Donald's brother), it should be mentioned, is chairman of the Leith Dock Commission, and presided at the opening of the Dock.

Amongst other important events in which Sir Donald Currie has been actively engaged, we may refer to the congress held at Brussels, in 1877, under the auspices of the International Association, for the exploration of Eastern Central Africa, presided over by the King of the Belgians. Sir Donald was a member of this congress, and rendered valuable aid in putting before the meeting such facts as were well within his own personal knowledge in regard to the question under discussion. Indeed, from the time of his first taking an interest in African affairs, he has always been considered an authority on matters connected with that part of the globe, for he not only made it his chief business as a commercial man to master the details of the geography, condition, and resources of a country in which his chief interests were centred, but was at all times ready to give the public the benefit of the information he had acquired by personal business contact with that remote part of the earth. His Majesty Leopold II. was so favourably impressed by Sir Donald in the intercourse he had had with him on that occasion, that, on visiting England in 1879, he was pleased to have the opportunity of renewing the acquaintance. Sir

Donald entertained the King and his suite on board the mail steamer, *Warwick Castle*, and subsequently had the honour of conducting his distinguished guests on a tour of inspection through the extensive docks and warehouses of the East and West India Dock Company.

Of late years Sir Donald has taken a more active interest than formerly in his native country. He always evinced a strong affection for Scotland, even when he has seemed to be almost cut adrift from her, but with advancing years there has been a renewing and a strengthening of the old ties, and to-day Sir Donald Currie is as proud of his Scottish connection as if he had never severed himself from the "land of the mountain and the flood." For many years Sir Donald spent the main portion of the Summer and Autumn months in Perthshire, and in 1880 the chance offered of purchasing a favourable residential estate there, and he availed himself of it. This was the historical estate of Garth, near Aberfeldy, where there are the remains of an ancient castle or fortress, which had once upon a time been the stronghold of the Wolf of Badenoch, and was long in the possession of the Stuarts. Sir Donald has called one of his finest vessels after this famous keep of the olden time. Last year Sir Donald was able to add to this possession the neighbouring estate of Glenlyon, and the combined properties stretch from the River Lyon to the foot of Schiehallion. The proprietor of Garth and Glenlyon has a residence in London also, and is a member of the Reform and City Liberal Clubs. He takes a deep interest in public affairs, and both in the House of Commons and in commercial circles commands general esteem for his energy of character, his ready grasp of details, and, above all, his intense earnestness.

The character of Sir Donald Currie, however, is reflected most powerfully in the splendid line of steamships which bear his name, and in the completeness of their equipment, the solid elegance of their construction, and their fine sea-going qualities we find the best evidence of his foresight and manly energy. As samples of naval architecture these ships will bear comparison with any steamers afloat. A brief description of one of three largest vessels of the fleet will serve to bear out this statement. The *Norham Castle*, the *Hawarden Castle*, and the *Roslin Castle* are all built on the same model, and are the latest additions to the fleet. The *Hawarden Castle*, so named in honour of Sir Donald Currie's political leader and friend, was launched from the Fairfield shipbuilding yard of Messrs. John Elder & Co., Glasgow, in January 1883, the christening ceremony being performed by Mrs. Gladstone, in the presence of a distinguished company. The dimensions of the ship are as follows: length on water line, 380 feet; length over all, 393 feet 6 inches; breadth, 48 feet; depth, 33 feet; with a gross tonnage of 4,300 tons. The vessel is of the three-decked type, with large top-gallant forecastle for crew, petty officers, and conveniences. A large bridge-house, 100 feet long, is fitted amidships, enclosing engines and boiler hatches, and containing accommodation for officers, engineers, galleys, sculleries, bakery, workshops, store rooms, &c. Two deck houses are also fitted aft, enclosing saloon entrance, smoking saloon, ladies' boudoir, captain's cabin, saloon well, &c. A look-out bridge is fitted before the foremast, and also a hurricane bridge over the chart and wheel house on the bridge deck. The vessel is brig-rigged, the masts and yards being of steel. The ship is divided into nine principal water-tight compartments, the divisions being carried to the upper deck, four of these being fitted with water-tight and fire-proof doors, giving access from one part of the steamer to another. By this arrangement the danger of fire spreading, should it break out in any division of the ship, is obviated, and greater safety insured by being able to isolate any one compartment in case of damage to the hull, or for sanitary purposes, and the compartment being flooded. Several of the compartments are also subdivided by partially water-tight bulkheads extending to the hold beams, forming ballast tanks, provision being made for several hundred tons of water ballast in order to secure regularity of trim in the passage. The special care taken in providing for the safety of the ship and the lives on board entitles these vessels to rank as transports of the highest class, and they are entered on the Admiralty list, being specially constructed, as were the former vessels of the fleet, to the requirements of the "service" for vessels for war purposes, the three decks being of iron or steel, covered with teak, and suitable in all respects for carrying guns of large calibre. The whole of the entrances, corridors, saloon, smoking-saloon, ladies' boudoir, captain's cabin, chart room, engine room, &c., are fitted with electric lights on the incandescent principle, which greatly adds to the effect of the beautiful decorations throughout. Over the after-deckhouse and extending right to the taffrail, and over the full breath of the vessel, is fitted a hurricane deck, forming an extensive promenade for the sole use of first-class passengers. The second-class saloon and state-rooms are arranged forward of the machinery space, and are all fitted up in a most substantial and complete manner for the accommodation of this class of passengers. Forward to this, again, is placed the Government second-class saloon and state-rooms, a somewhat new institution in the way of carrying passengers by this line. Accommodation is provided for about 190 first-class and 160 second-class passengers. Each vessel carries the large number of ten boats, eight of which are life-boats of very large dimensions. The engines are compound, inverted, direct acting, of the most improved type, indicating nearly 4,000 horse-power, the high pressure cylinder being 50 inches in diameter, and the low-pressure 90 inches in diameter, with a stroke of 60 inches. The pumping power is exceedingly great, the vessel having Gwynne's centrifugal pumps and donkey-engine pumps of large capacity in addition to the engine pumps, and capable of discharging overboard 40 tons of water per minute.

Few more impressive and interesting sights are to be witnessed than the going forth from England of one of these mighty vessels. If the shade of Dr. Johnson could revisit these "glimpses of the moon," and see what provision Sir Donald Currie has made for the comfort of ocean bound passengers on his magnificent vessels, the well-worn expression of the great lexicographer that a ship was "a prison, with the chance of being drowned," would doubtless be unreservedly withdrawn. Steamers of the Castle Line order are the very reverse of prisons; they are floating hotels, fitted up with every modern luxury, even including the electric light and electric bells. Their whole aspect, internal and external, is suggestive of British solidity, British comfort, and British thoroughness.

Let us fancy ourselves on board one of the newest vessels of the line, outward bound. In the grey dawn of an autumn morning the big ship glides slowly out of the East India Dock Basin, at Blackwall, and silently makes its way into the Thames, where craft of all descriptions lie about, and forests of masts and riggings are revealed here and there in the dim background. The lamps on the quays and wharves have not yet been put out, and from many a mast shines forth the steady signal-light which has been burning through the night. A few muffled figures are on deck watching the mighty city recede into the distance, doubtless touched by the sentiment of parting, but, these apart, the sailors and stevedores have the deck pretty much to themselves, and busy enough they are putting things into final ship-shape for a smooth encounter with the greater world of waters towards which the ship is voyaging. A sort of poetic haze rests upon the scene in the subdued light of the awakening day, and the city

> "now doth like a garment wear
> The beauty of the morning; silent, bare,
> Ships, towers, domes, theatres and temples lie
> Open unto the fields, and to the sky,
> All bright and glittering in the smokeless air."

But the screw keeps up its half-suppressed mur-

murings and groanings, and the ship goes on and on, until London slips ultimately out of sight, and the few watchers on deck let it go with a sigh, in which there is a touch of relief as well as of regret, and turn their gaze forward instead of backward. And, indeed, they have much to see on the borderland of this "silent highway." Greenwich, with its white-faced hospital front staring grimly across the river, its time-reminding Observatory tower stretching up in the distance, and its reminiscences of whitebait and exorbitance, is passed; and then by a series of sharp curves the ship steams along past the low-lying shore of Essex on the left, and the verdant slopes of Kent on the right; and forward to Gravesend, leaving Rosherville and its memories of "happy days" behind. Forward we go through the growing sunlight, the broadening river, and the increasing desolation. Great lonely factories are seen at long intervals, their gigantic sign-boards indicating only too clearly the mal-odorous nature of the operations carried on within them. But our attention does not rest on the shore so much now. The waters are all about us, and there are many other vessels coming and going, small ships and large, clumsy and trim. Some of the steamers we meet seem almost as big as our own Castle Liner, and as their passengers and sailors crowd to the side to give us greeting and God-speed, we return them the salute and wonder who they are and where they have come from, without caring sufficiently, however, to exert ourselves to the extent of asking the sailors (who doubtless know all about it) for information.

As we have been nearing the mouth of the river we have been gradually made aware of the presence of a steam-tug in our immediate vicinity. It appears to have made up its mind to keep even pace with us, and not to leave us, but for all that, not a soul on board of her shows the slightest consciousness of the existence of our great steamer. The paddle pulses of the tug, and its furious foamings, are demonstrative enough, but neither the weather-beaten ancient mariner who stands on the right paddle-box and makes beckoning motions with his hands to his subordinates, nor those grimy subordinates themselves, seem to accord us the least shadow of recognition. And so we go along mile after mile, side by side, and Tilbury Fort is passed, with a blessing on the memory of Queen Elizabeth, and we get out to the Nore and into the Channel. Then the churning paddles of the tug draw closer, and our Castle Liner and the tug simultaneously come to a stand. We have, in truth, been run down and boarded, but as the boarding party turns out to be nothing more formidable than a Channel pilot we do not make any demur. Exchanges are presently made; the first pilot, and a gentleman in charge, and the stevedores are all taken aboard the tug; then, after a round of hearty cheers from them, and as hearty a response from our own sailors, the tug turns back and we go forward to face the day in the English Channel.

Long ere this our couple of hundred cabin passengers or so have been moving actively about, entering into conversation one with another, forming sudden friendships, and ranging themselves in picturesque groups. The companionship of the breakfast-table serves to break the ice of formality; luncheon imparts a still warmer wave of harmonious feeling; and the generous dinner, with its large variety of seasonable things in the shape of fish, flesh, fowl and beverages, completes the thaw, and from that time forward the saloon voyagers are as one happy family. What else could happen amid such pleasant surroundings? Sir John Hautboy may be a very stiff and starchy personage within the limits of his ancestral domain at home; Don Pistachio Comporto, with his dark visage and his pointed shoes, may be a tyrant of tyrants amongst the slaves of his Portuguese vineyard; General Rigid Rampart, on his way to take charge of some South African station, may be the strictest martinet in her Majesty's service, when on duty; and Miss Dazzle, the heiress, who has already been accorded the position of belle of the ship, may be very unbending in her social condescensions when the lights of society are upon her; but here, cast adrift from everyday usages, and thrown into close contact with what almost seems to be a new humanity, their better natures assert themselves and all are bound together by the delights of this temporary kinship. Clerical gentlemen, wealthy farmers, mining speculators, professional fortune-seekers, newspaper correspondents, healthhunters, and many other "sorts and conditions of men" (and women) are gathered together on board this great vessel, but with the past or the future they appear to have for the time being no concern. So the day advances, and the steamer ploughs its way along past Herne Bay, Margate, Broadstairs, Ramsgate, and Dover, the white cliffs and the rugged heights affording abundant material for admiration. Brighton, Hastings, and Portsmouth are left behind, and as night draws near the beautiful coast of the Isle of Wight is sighted. Then darkness gradually falls, and the brilliantly lighted saloon becomes the scene of diversion for the main portion of the passengers, although the sumptuous ladies' boudoir, and the much-mirrored smoking-room, draw off their share of votaries. So the night passes much the same as it would pass at a first-class hotel, the neatly-dressed stewards being always at command. There are probably no steamers afloat which afford more excellent accommodation than this, no single department evincing the least short-coming, while as for the officers, from the captain down to the youngest mate, there is an efficiency of service which says a great deal for those who had the choosing of them. The engineers, by-the-way, are Scotch to a man.

The next morning we awake into a mysterious silence. The screw is hushed, and no sound of beating waves is heard. We are in Dartmouth harbour, enclosed within a semicircle of tree-clad hills, with quaint gables rising one over another here and there. It is a most picturesque scene. Here we take fresh passengers on board, and at mid-day the steamer moves off into the Channel again, and bears away for the Bay of Biscay. In less than four days the ship will touch at Madeira, and in less than three weeks will reach Cape Town.

And so the sailings continue every fortnight all the year round, proceeding alternately by Lisbon and by Madeira, and occasionally calling at St. Helena. The organization of such a fleet as is necessary for the effective management of this important service must have been a stupendous work, and when we consider that all this has been accomplished in the comparatively short space of fifteen years, and in honourable rivalry with the Company which had formerly the monopoly of the mail service, we can but award the man who has been the main instrument of the achievement a foremost place in the ranks of modern shipping princes.

THE END.